

Power Semiconductors

Power Modules

RF Power MOSFETs

# About Microsemi

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Microsemi Power Products Group was created in 2006 with the acquisition of Advanced Power Technology, Inc., a company at the forefront of power semiconductor technology since its founding in 1984.

Our focus is on high voltage, high power and high performance applications. Our commitment is to maintain and enhance this position as a technological leader in MOS controlled devices and Diodes and to deliver products which contribute to our customers' success in delivering higher performance power systems.

Service... Outstanding technology is only part of the story. A global network of stocking distributors, representatives, applications engineers, and web tools are in place to support all phases of your product design, evaluation and procurement activities. In a world which demands superior execution, we've won numerous awards as a service leader.

Quality... Our commitment is to excellence in all things we do. Whether you are evaluating the quality of our products, our technical assistance, our customer service or the quality of our internal communications systems, excellence is our standard. Continuous improvement is fundamental to our business!

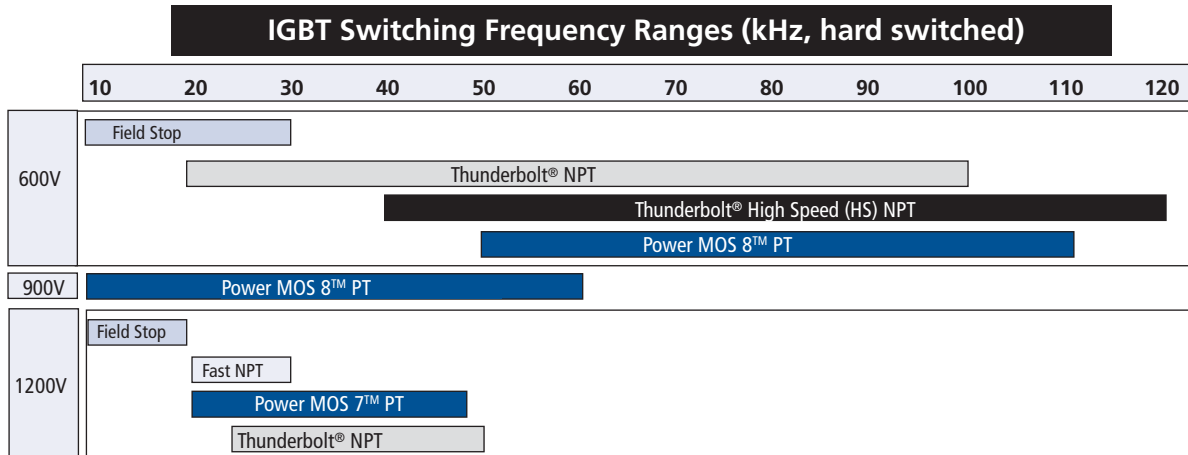
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# Insulated Gate Bipolar Transistors (IGBTs)

## IGBTs from Microsemi Power Products Group (PPG)

IGBT products from Microsemi PPG provide high quality solutions for a wide range of high voltage, high power applications. The switching frequency range spans from DC for minimal conduction loss to over 100kHz for very high power density SMPS applications. The frequency range for each product type is shown in the graph below. Each IGBT product represents the latest in IGBT technology, providing the best possible performance/cost combination for the targeted application. There are six product series that utilize three different IGBT technologies: Non-Punch-Through (NPT), Punch-Through (PT) and Field Stop.



Standard Series	Voltage Ratings (V)	Technology	Easy to Parallel	Short Circuit SOA	Comment
Thunderbolt®	600, 1200	NPT	X	X	General purpose, high speed
Thunderbolt® High Speed	600	NPT	X	X	Highest speed
FAST	1200	NPT	X	X	General purpose, medium speed
MOS 7™	1200	PT			Ultra-low gate charge
MOS 8™	600, 900	PT			Highest efficiency
Field Stop Trench Gate	600, 1200	Field Stop	X	X	Lowest conduction loss

## Product Options

All standard IGBT products are available as a single IGBT or as a Combi product packaged with an anti-parallel DQ series diode. Package options include TO-220, TO-247, T-Max®, TO-264, and SOT-227. Customized products are available; contact factory for details.

## Resonant Mode Combi

Resonant Mode Combi products, which are high speed IGBTs packaged with a low VF anti-parallel DL series diode. These Combis are intended for use in resonant mode circuits, such as the phase shifted bridge, where fast turn-off of the IGBT is needed but the recovery speed of the anti-parallel diode is less important than its forward voltage. Resonant Mode IGBTs maximize efficiency by reducing turn-off switching loss in the IGBT and minimizing conduction loss of the anti-parallel diode. The table below summarizes the key features and technology for the Resonant Mode IGBT products.

Resonant Mode Series	Voltage Ratings (V)	Technology	Easy to Parallel	Short Circuit SOA	Comment
Thunderbolt®	600, 1200	NPT	X	X	General purpose, high speed
Thunderbolt® High Speed	600	NPT	X	X	Highest speed
MOS 7	600	PT			Highest efficiency

# Insulated Gate Bipolar Transistors (IGBTs)

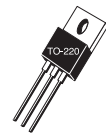
## POWER MOS 8™

- PT Technology
- Fast Switching
- Highest Efficiency
- Combi with High Speed DQ Diode

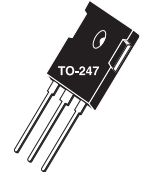
## FIELD STOP

- Trench Technology
- Short Circuit Rated
- Lowest Conduction Loss
- Easy Paralleling
- Combi with High Speed DQ Diode

	BV <sub>CES</sub> Volts	V <sub>CE(ON)</sub> Typ 25°C	I <sub>C2</sub> 100°C	Recommended Maximum I <sub>C</sub>		Part Number	Package Style	
				50 kHz	80 kHz			
<b>POWER MOS 8™</b>	SINGLE	600	2.0	28	19	14	APT28GA60K	TO-220
			2.0	36	21	17	APT36GA60B	TO-247 or D <sup>3</sup>
	2.0		44	26	20	APT44GA60B	TO-247 or D <sup>3</sup>	
	2.0		54	30	23	APT54GA60B	TO-247 or D <sup>3</sup>	
	2.0		68	35	27	APT68GA60B	TO-247 or D <sup>3</sup>	
	2.0		80	40	31	APT80GA60B	TO-247 or D <sup>3</sup>	
	2.0	102	51	39	APT102GA60B2	T-MAX® or TO-264		
	900	SINGLE	2.5	27	14	8	APT27GA90K	TO-220
			2.5	35	17	10	APT35GA90B	TO-247 or D <sup>3</sup>
		2.5	43	21	13	APT43GA90B	TO-247 or D <sup>3</sup>	
		2.5	64	29	19	APT64GA90B	TO-247 or D <sup>3</sup>	
		2.5	80	34	23	APT80GA90B	TO-247 or D <sup>3</sup>	
		Combi (IGBT & "DQ" FRED)		2.5	27	14	8	APT27GA90K
	600	SINGLE	2.0	28	19	14	APT28GA60BD15	TO-247 or D <sup>3</sup>
			2.0	36	21	17	APT36GA60BD15	TO-247 or D <sup>3</sup>
			2.0	44	26	20	APT44GA60BD30	TO-247 or D <sup>3</sup>
			2.0	47	39	30	APT47GA60JD40	ISOTOP®
			2.0	54	30	23	APT54GA60BD30	TO-247 or D <sup>3</sup>
			2.0	60	48	36	APT60GA60JD60	ISOTOP®
			2.0	68	35	27	APT68GA60BD240	T-MAX® or TO-264
			2.0	80	40	31	APT80GA60LD40	TO-264
	900	SINGLE	2.5	27	14	8	APT27GA90BD15	TO-247 or D <sup>3</sup>
			2.5	35	17	10	APT35GA90BD15	TO-247 or D <sup>3</sup>
			2.5	43	21	13	APT43GA90BD30	TO-247 or D <sup>3</sup>
2.5			46	33	21	APT46GA90JD40	ISOTOP®	
2.5			64	29	19	APT64GA90B2D30	T-MAX® or TO-264	
2.5			80	34	23	APT80GA90LD40	TO-264	
<b>FIELD STOP</b>	SINGLE	600	1.5	24	15	10	APT20GN60BG	TO-247 or D <sup>3</sup>
			1.5	37	20	14	APT30GN60BG	TO-247 or D <sup>3</sup>
	1.5		64	30	21	APT50GN60BG	TO-247 or D <sup>3</sup>	
	1.5		93	42	30	APT75GN60BG	TO-247 or D <sup>3</sup>	
	1.5		123	75	47	APT150GN60J	ISOTOP®	
	1.5		135	54	39	APT100GN60B2G	T-MAX®	
	1.5	190	79	57	APT150GN60B2G	T-MAX®		
	1.5	230	103	75	APT200GN60B2G	T-MAX®		
	1.5	158	100	66	APT200GN60J	ISOTOP®		
	1200	SINGLE	1.7	33	19	13	APT25GN120BG	TO-247 or D <sup>3</sup>
			1.7	46	24	17	APT35GN120BG	TO-247 or D <sup>3</sup>
			1.7	66	32	22	APT50GN120B2G	T-MAX®
			1.7	70	44	27	APT100GN120J	ISOTOP®
			1.7	99	45	30	APT75GN120B2G	T-MAX® or TO-264
			1.7	120	58	38	APT100GN120B2G	T-MAX®
	1.7	99	60	36	APT150GN120J	ISOTOP®		
	600	SINGLE	1.5	24	15	10	APT20GN60BDQ1G	TO-247 or D <sup>3</sup>
			1.5	37	20	14	APT30GN60BDQ2G	TO-247 or D <sup>3</sup>
			1.5	64	30	21	APT50GN60BDQ2G	TO-247 or D <sup>3</sup>
			1.5	93	42	30	APT75GN60LDQ3G	TO-264
			1.5	123	75	47	APT150GN60JDQ4	ISOTOP®
			1.5	135	54	39	APT100GN60LDQ4G	TO-264
			1.5	190	79	57	APT150GN60LDQ4G	TO-264
			1.5	158	100	66	APT200GN60JDQ4	ISOTOP®
1200	SINGLE	1.7	22	14	10	APT15GN120BDQ1G	TO-247 or D <sup>3</sup>	
		1.7	33	19	13	APT25GN120B2DQ2G	T-MAX®	
		1.7	46	24	17	APT35GN120L2DQ2G	264-MAX™	
		1.7	57	36	22	APT75GN120JDQ3	ISOTOP®	
		1.7	66	32	22	APT50GN120L2DQ2G	264-MAX™	
		1.7	70	44	27	APT100GN120JDQ4	ISOTOP®	
1.7	99	60	36	APT150GN120JDQ4	ISOTOP®			
Combi (IGBT & "DQ" FRED)		1.7	22	14	10	APT15GN120BDQ1G	TO-247 or D <sup>3</sup>	
600	SINGLE	1.5	24	15	10	APT20GN60BDQ1G	TO-247 or D <sup>3</sup>	
		1.5	37	20	14	APT30GN60BDQ2G	TO-247 or D <sup>3</sup>	
		1.5	64	30	21	APT50GN60BDQ2G	TO-247 or D <sup>3</sup>	
		1.5	93	42	30	APT75GN60LDQ3G	TO-264	
		1.5	123	75	47	APT150GN60JDQ4	ISOTOP®	
		1.5	135	54	39	APT100GN60LDQ4G	TO-264	
1200	SINGLE	1.7	22	14	10	APT15GN120BDQ1G	TO-247 or D <sup>3</sup>	
		1.7	33	19	13	APT25GN120B2DQ2G	T-MAX®	
		1.7	46	24	17	APT35GN120L2DQ2G	264-MAX™	
		1.7	57	36	22	APT75GN120JDQ3	ISOTOP®	
		1.7	66	32	22	APT50GN120L2DQ2G	264-MAX™	
		1.7	70	44	27	APT100GN120JDQ4	ISOTOP®	
1.7	99	60	36	APT150GN120JDQ4	ISOTOP®			



TO-220



TO-247[B]

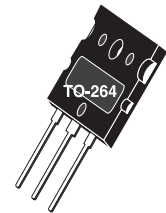


D<sup>3</sup> PAK[S]

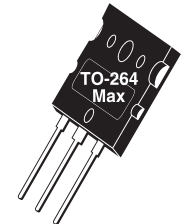
Part Numbers for D<sup>3</sup> packages - replace "B" with "S" in part number



T-MAX®[B2]

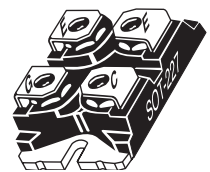


TO-264[L]

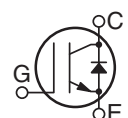


264-MAX™[L2]

Part Numbers for TO-264 packages - replace "B2" with "L" in part number



ISOTOP®[J]  
SOT-227



Current @ Frequency Test Conditions: T<sub>j</sub> = 125°C, T<sub>c</sub> = 100°C except Isotop® where T<sub>c</sub> = 80°C, V<sub>cc</sub> = 67% rated voltage Hard Switch

# Insulated Gate Bipolar Transistors (IGBTs)

## Power MOS 7® and IGBT

- PT Technology
- Ultra-low Gate Charge
- Combi with High Speed DQ Diode

## THUNDERBOLT®

- NPT Technology
- Short Circuit Rated
- Moderate to High Frequency
- Easy Paralleling

## THUNDERBOLT® HIGH SPEED

- High Speed Switching - Reduced Eoff
- Fastest Switching
- NPT Technology

## FAST

- NPT Technology
- Short Circuit Rated
- Low to Moderate Freq.
- Low Conduction Loss
- Easy Paralleling

## RESONANT MODE COMBI IGBTs

- NPT or PT Technology
- Low  $V_f$  Diode
- Ultrasoft Recovery Diode
- Avalanche Rated
- High Speed Switching-Reduced  $E_{off}$

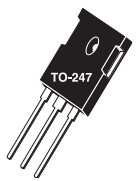
BV <sub>CES</sub> Volts	V <sub>CE(ON)</sub> Typ 25°C	I <sub>C2</sub> 100°C	Recommended Maximum I <sub>C</sub>		Part Number	Package Style
			20 kHz	40 kHz		
1200	<b>SINGLE</b>		20 kHz	40 kHz		
	3.3	33	19	12	APT25GP120BG	TO-247
		46	24	15	APT35GP120BG	TO-247
		54	29	18	APT45GP120BG	TO-247
		34	28	18	APT45GP120J	ISOTOP
		91	42	24	APT75GP120B2G	T-MAX™
	57	40	23	APT75GP120J	ISOTOP	
	<b>Combi (IGBT &amp; "DQ" FRED)</b>		20 kHz	40 kHz		
	3.3	20	11	7	APT13GP120BDQ1G	TO-247
		33	19	12	APT25GP120BDQ1G	TO-247
46		24	15	APT35GP120B2DQ2G	T-MAX™	
54		29	18	APT45GP120B2DQ2G	T-MAX™	
34		28	18	APT45GP120JDQ2	ISOTOP	
57	40	23	APT75GP120JDQ3	ISOTOP		
600	<b>SINGLE</b>		30 kHz	60 kHz		
	2.0	20	14	10	APT20GT60KRG	TO-220
		20	14	10	APT20GT60BRG	TO-247 or D <sup>3</sup>
		30	19	13	APT30GT60BRG	TO-247 or D <sup>3</sup>
		40	25	16	APT40GT60BRG	TO-247 or D <sup>3</sup>
		50	30	20	APT50GT60BRG	TO-247 or D <sup>3</sup>
		60	35	22	APT60GT60BRG	TO-247 or D <sup>3</sup>
		100	56	35	APT100GT60B2RG	T-MAX® or TO-264
	3.2	18	11	8	APT15GT120BRG	TO-247 or D <sup>3</sup>
		25	16	11	APT25GT120BRG	TO-247 or D <sup>3</sup>
50		27	17	APT50GT120B2RG	T-MAX® or TO-264	
60		40	21	APT100GT120JR	ISOTOP®	
90		52	25	APT150GT120JR	ISOTOP®	
<b>Combi (IGBT &amp; "DQ" FRED)</b>		30 kHz	60 kHz			
2.0	15	11	8	APT15GT60BRDQ1G	TO-247 or D <sup>3</sup>	
	20	14	10	APT20GT60BRDQ1G	TO-247 or D <sup>3</sup>	
	30	19	13	APT30GT60BRDQ2G	TO-247 or D <sup>3</sup>	
	48	29	18	APT60GT60JRDQ3	ISOTOP®	
	50	30	20	APT50GT60BRDQ2G	TO-247 or D <sup>3</sup>	
	100	37	22	APT100GT60JRDQ4	ISOTOP®	
1200	<b>SINGLE</b>		20 kHz	40 kHz		
	3.2	18	11	8	APT15GT120BRDQ1G	TO-247 or D <sup>3</sup>
		25	16	11	APT25GT120BRDQ2G	TO-247 or D <sup>3</sup>
		50	27	17	APT50GT120B2RDQ2G	T-MAX® or TO-264
		42	34	19	APT75GT120JRDQ3	ISOTOP®
60		40	21	APT100GT120JRDQ4	ISOTOP®	
600	<b>SINGLE</b>		50 kHz	80 kHz		
	2.8	30	14	9	APT30GS60KRG	TO-220
		50	23	16	APT50GS60BRG	TO-247 or D <sup>3</sup>
<b>Combi (IGBT &amp; "DQ" FRED)</b>		50 kHz	80 kHz			
2.8	30	14	9	APT30GS60BRDQ2G	TO-247 or D <sup>3</sup>	
	50	23	16	APT50GS60BRDQ2G	TO-247 or D <sup>3</sup>	
1200	<b>SINGLE</b>		15 kHz	30 kHz		
	2.5	14	8	5	APT11GF120KRG	TO-220
		20	11	7	APT20GF120KRG	TO-220
		35	16	10	APT33GF120BRG	TO-247 or D <sup>3</sup>
		75	27	17	APT50GF120B2RG	T-MAX®
		75	27	17	APT50GF120LRG	TO-264
75		27	17	APT50GF120LRG	TO-264	
1200	<b>Combi (IGBT &amp; "DQ" FRED)</b>		15 kHz	30 kHz		
	2.5	35	16	10	APT33GF120B2RDQ2G	T-MAX®
		64	33	17	APT50GF120JRDQ3	ISOTOP®
80		42	20	APT60GF120JRDQ3	ISOTOP®	
600	<b>Combi (IGBT &amp; "DL" FRED)</b>		50 kHz	80 kHz		
	2.8	50	23	16	APT50GS60BRDLG	TO-247
		30	14	9	APT30GS60BRDLG	TO-247
		50	41	31	APT50GP60LDL	TO-264
		45	28	22	APT30GP60B2DL	T-MAX® or TO-264
25		17	14	APT15GP60BDL	TO-247	
1200	<b>SINGLE</b>		20 kHz	40 kHz		
	3.2	25	16	11	APT25GT120BRDL	TO-247
		50	28	17	APT50GT120B2RDL	T-MAX®
		100	40	21	APT100GT120JRDL	ISOTOP®
100		40	21	APT100GT120JRDL	ISOTOP®	



TO-220[K]



D<sup>3</sup> PAK[S]

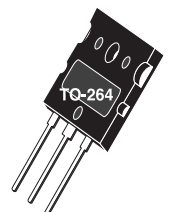


TO-247[B]

Part Numbers for D<sup>3</sup> packages - replace "B" with "S" in part number

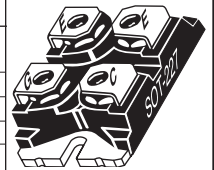


T-MAX®[B2]

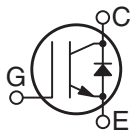


TO-264[L]

Part Numbers for L packages - replace "B2" with "L" in part number



ISOTOP®[J]  
SOT-227



Current @ Frequency Test Conditions: T<sub>j</sub> = 125°C, T<sub>c</sub> = 100°C except Isotop® where T<sub>c</sub> = 80°C, V<sub>cc</sub> = 67% rated voltage Hard Switch

## NEW Power MOS 8™ MOSFETs / FREDFETs (fast body diode)



Power MOS 8™ is Microsemi's latest family of high speed, high voltage (500-1200V) N-channel switch-mode power transistors with lower EMI characteristics and lower cost compared to previous generation devices. These new MOSFETs /FREDFETs have been optimized for both hard and soft switching in high frequency, high voltage applications rated above 500W. There are 2 product types in the Power MOS 8™ MOSFET family:



- 1) **MOSFET**
- 2) **FREDFETs** have a fast recovery body diode characteristic, providing high commutation  $dv/dt$  ruggedness and high reliability in ZVS circuits.

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### Features

- Fast switching
- Low EMI
- Quiet switching
- Avalanche energy rated
- Low gate charge
- Lower cost

### Applications

- Power factor correction
  - Server and telecom power systems
  - Solar inverters
  - Arc welding
  - Plasma cutting
  - Battery chargers
  - Medical
  - Semiconductor capital equipment
  - Induction heating
- 

### Quiet Switching

The new Power MOS 8™ series is a result of extensive research into quiet switching. Input and reverse transfer capacitance values as well as their ratio were set at specific values to achieve quiet switching with minimal switching loss. The Power MOS 8™ series of devices are inherently quiet switching, stable when connected in parallel, very efficient, and lower cost than previous generations.

### Body Diode Options

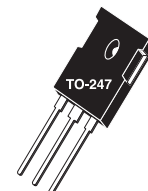
As with previous generation products, Power MOS 8™ MOSFETs and FREDFETs are available in all voltage ratings. A FREDFET is a MOSFET with a faster recovery intrinsic body diode. This results in improved reliability in ZVS circuits due to shorter minority carrier lifetime and increased commutation  $dv/dt$  ruggedness. If a fast recovery body diode is not needed, MOSFET versions are available.

# Power MOS 8™ MOSFETs / FREDFETs

BV <sub>(DSS)</sub> Volts	R <sub>DS(ON)</sub> Max	I <sub>D</sub>	MOSFET Part #	I <sub>D</sub>	FREDFET Part #	Package Style
1200	3.80	5	APT4M120K			TO-220
	4.20			4	APT4F120K	TO-220
	2.40			7	APT7F120B	TO-247 or D <sup>3</sup>
	2.10	8	APT7M120B			TO-247 or D <sup>3</sup>
	1.20			14	APT13F120B	TO-247 or D <sup>3</sup>
	1.10	14	APT14M120B			TO-247 or D <sup>3</sup>
	0.70			23	APT22F120B2	T-MAX® or TO-264
	0.63	24	APT24M120B2			T-MAX® or TO-264
	0.58			27	APT26F120B2	T-MAX® or TO-264
	0.58			18	APT17F120J	ISOTOP®
	0.53	29	APT28M120B2			T-MAX® or TO-264
	0.53	19	APT19M120J			ISOTOP®
	0.32			33	APT32F120J	ISOTOP®
0.29	35	APT34M120J			ISOTOP®	
1000	2.80			5	APT5F100K	TO-220
	2.50	6	APT6M100K			TO-220
	2.00			7	APT7F100B	TO-247
	1.80	8	APT8M100B			TO-247 or D <sup>3</sup>
	1.60			9	APT9F100B	TO-247 or D <sup>3</sup>
	1.40	9	APT9M100B			TO-247 or D <sup>3</sup>
	0.98			14	APT14F100B	TO-247 or D <sup>3</sup>
	0.88	14	APT14M100B			TO-247 or D <sup>3</sup>
	0.78			17	APT17F100B	TO-247 or D <sup>3</sup>
	0.70	18	APT18M100B			TO-247 or D <sup>3</sup>
	0.44			30	APT29F100B2	T-MAX® or TO-264
	0.44			20	APT19F100J	ISOTOP®
	0.38	32	APT31M100B2	35	APT34F100B2	T-MAX® or TO-264
	0.38	21	APT21M100J	23	APT22F100J	ISOTOP®
	0.33	37	APT37M100B2			T-MAX® or TO-264
	0.33	25	APT25M100J			ISOTOP®
0.20			42	APT41F100J	ISOTOP®	
0.18	45	APT45M100J			ISOTOP®	
800	1.50			7	APT7F80K	TO-220
	1.35	8	APT8M80K			TO-220
	0.90			12	APT11F80B	TO-247 or D <sup>3</sup>
	0.80	13	APT12M80B			TO-247 or D <sup>3</sup>
	0.58			18	APT17F80B	TO-247 or D <sup>3</sup>
	0.53	19	APT18M80B			TO-247 or D <sup>3</sup>
	0.43			23	APT22F80B	TO-247 or D <sup>3</sup>
	0.39	25	APT24M80B			TO-247 or D <sup>3</sup>
	0.24			41	APT38F80B2	T-MAX® or TO-264
	0.21	43	APT41M80B2	47	APT44F80B2	T-MAX® or TO-264
	0.21			31	APT29F80J	ISOTOP®
	0.19	49	APT48M80B2			T-MAX® or TO-264
	0.19	33	APT32M80J			ISOTOP®
	0.11			57	APT53F80J	ISOTOP®
0.10	60	APT58M80J			ISOTOP®	



TO-220[K]

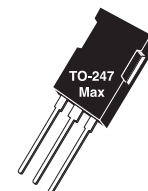


TO-247[B]

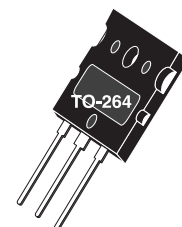


D<sup>3</sup> PAK[S]

Part Numbers for D<sup>3</sup> packages - replace "B" with "S" in part number



T-MAX®[B2]



TO-264[L]

Part Numbers for TO-264 packages - replace "B2" with "L" in part number



ISOTOP®[J]  
SOT-227  
(ISOLATED BASE)

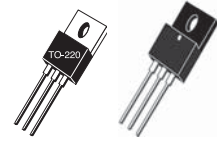
## Power MOS 8™ MOSFETs / FREDFETs

BV <sub>(DSS)</sub> Volts	R <sub>DS(ON)</sub> Max	I <sub>D</sub>	MOSFET Part #	I <sub>D</sub>	FREDFET Part #	Package
600	0.62			12	APT12F60K	TO-220
	0.43			16	APT15F60B	TO-247 or D <sup>3</sup>
	0.37			19	APT18F60B	TO-247 or D <sup>3</sup>
	0.29			24	APT23F60B	TO-247 or D <sup>3</sup>
	0.22			30	APT28F60B	TO-247 or D <sup>3</sup>
	0.19	36	APT34M60B	36	APT34F60B	TO-247 or D <sup>3</sup>
	0.15	45	APT43M60B2	45	APT43F60B2	T-MAX® or TO-264
	0.15	31	APT30M60J	31	APT30F60J	ISOTOP®
	0.11	60	APT56M60B2	60	APT56F60B2	T-MAX® or TO-264
	0.11	42	APT39M60J	42	APT39F60J	ISOTOP®
	0.09	70	APT66M60B2	70	APT66F60B2	T-MAX® or TO-264
	0.09	49	APT47M60J	49	APT47F60J	ISOTOP®
0.055	84	APT80M60J	84	APT80F60J	ISOTOP®	
500	0.39			15	APT15F50K	TO-220[K] or TO-220[KF]*
	0.30			20	APT20F50B	TO-247 or D <sup>3</sup>
	0.24			24	APT24F50B	TO-247 or D <sup>3</sup>
	0.19			30	APT30F50B	TO-247 or D <sup>3</sup>
	0.15			37	APT37F50B	TO-247 or D <sup>3</sup>
	0.13			43	APT42F50B	TO-247 or D <sup>3</sup>
	0.10	56	APT56M50B2	56	APT56F50B2	T-MAX® or TO-264
	0.10	38	APT38M50J	38	APT38F50J	ISOTOP®
	0.075	75	APT75M50B2	75	APT75F50B2	T-MAX® or TO-264
	0.075	51	APT51M50J	51	APT51F50J	ISOTOP®
	0.062	84	APT84M50B2	84	APT84F50B2	T-MAX® or TO-264
	0.062	58	APT58M50J	58	APT58F50J	ISOTOP®
0.036	103	APT100M50J	103	APT100F50J	ISOTOP®	

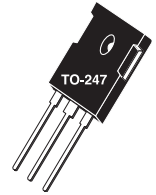
\* Available on APT15F50K

## Low Voltage Power MOS V® MOSFETs / FREDFETs

300	0.085	40	APT30M85BVVRG	40	APT30M85BVFRG	TO-247 or D <sup>3</sup>
	0.070	48	APT30M70BVVRG	48	APT30M70BVFRG	TO-247 or D <sup>3</sup>
	0.040	70	APT30M40JVVRG	70	APT30M40JVFRG	ISOTOP®
	0.019	130	APT30M19JVVR	130	APT30M19JVFR	ISOTOP®
200	0.045	56	APT20M45BVVRG	56	APT20M45BVFRG	TO-247 or D <sup>3</sup>
	0.038	67	APT20M38BVVRG	37	APT20M38BVFRG	TO-247 or D <sup>3</sup>
	0.022	100	APT20M22B2VVRG	100	APT20M22B2VFRG	T-MAX® or TO-264
	0.011	175	APT20M11JVVR	175	APT20M11JVFR	ISOTOP®



TO-220[K] or TO-220[KF]\*

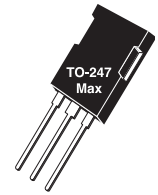


TO-247[B]

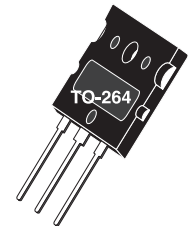


D<sup>3</sup> PAK[S]

Part Numbers for D<sup>3</sup> packages  
- replace "B" with "S" in part  
number



T-MAX®[B2]



TO-264[L]

Part Numbers for TO-264  
packages - replace "B2" with  
"L" in part number



ISOTOP®[J]  
SOT-227  
(ISOLATED BASE)



# Ultrafast, Low Gate Charge MOSFETs

## FOR 250 kHz - 2 MHz SWITCHING APPLICATIONS

The Ultrafast, Low Gate Charge MOSFET family combines the lowest gate charge available in the industry with Microsemi's proprietary self-aligned aluminum metal gate structure. The result is a MOSFET capable of extremely fast switching speeds and very low switching losses. The metal gate structure and the layout of these chips provide an internal series gate resistance (EGR) an order of magnitude lower than competitive devices built with a polysilicon gate.

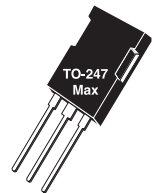
These devices are ideally suited for high frequency and pulsed high voltage applications.

### Typical Applications:

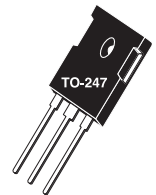
- Class D amplifiers up to 2 MHz
- High voltage pulsed DC
- AM transmitters
- Plasma deposition/etch

FEATURES:	BENEFITS:
• Series Gate Resistance (Rg) <0.1 ohm	• Fast switching, uniform signal propagation
• Tr and Tf times of <10ns	• Pulse power applications
• Industry's Lowest Gate Charge	• Fast switching, reduced gate drive power

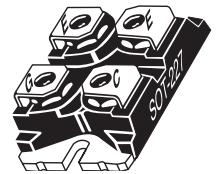
BV <sub>(DSS)</sub> Volts	R <sub>DS(ON)</sub> Max	I <sub>D</sub>	MOSFET Part #	FREDFET Part #	Package Style
1200	4.700	3.5		APT1204R7KFLG	T0-220
	4.700	3.5		APT1204R7BFLG	T0-247
	1.400	9		APT1201R4BFLG	T0-247
	0.670	18	APT12067B2LLG		T-MAX®
	0.670	17	APT12067JLL		ISOTOP®
	0.570	22	APT12057B2LLG		T-MAX®
	0.570	19	APT12057JLL		ISOTOP®
	0.310	30	APT12031JLL		ISOTOP®
1000	0.900	12	APT10090BLLG		T0-247
	0.780	14	APT10078BLLG		T0-247
	0.450	23	APT10045B2LLG		T-MAX® or T0-264
	0.450	21	APT10045JLL		ISOTOP®
	0.350	28	APT10035B2LL		T-MAX®
	0.350	25	APT10035JLL		ISOTOP®
	0.260	38		APT10026L2FLLG	T0-264 MAX
	0.260	30	APT10026JLL	APT10026JFLL	ISOTOP®
	0.210	37	APT10021JLL	APT10021JFLL	ISOTOP®
	0.140	52	APT8014L2LLLG	APT8014L2FLLG	T0-264 MAX
	0.110	51	APT8011JLL	APT8011JFLL	T-MAX™ or T0-264
	800	0.200	38	APT8020B2LL	
0.200		33	APT8020JLL		ISOTOP®
500	0.140	35	APT5014BLLG		T0-247
	0.100	46	APT5010B2LLG	APT5010B2FLLG	T-MAX® or T0-264
	0.065	67	APT50M65B2LLG	APT50M65B2FLLG	T-MAX® or T0-264
	0.065	58	APT50M65JLLG	APT50M65JFLLG	ISOTOP®
	0.075	51	APT50M75JLL	APT50M75JFLL	ISOTOP®
	0.075	57	APT50M75B2LLG		T-MAX® or T0-264
	0.050	71	APT50M50JLL		ISOTOP®
	0.038	88	APT50M38JLL		ISOTOP®



T-MAX®[B2]

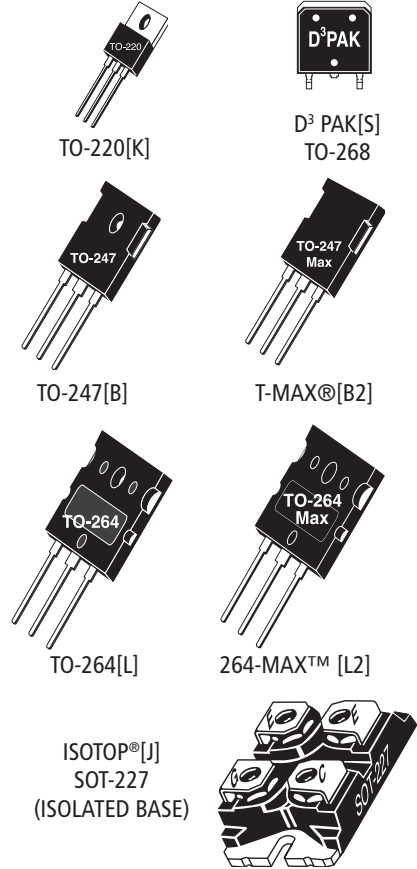


T0-247[B]



ISOTOP®[J]  
SOT-227  
(ISOLATED BASE)

BV <sub>DSS</sub> Volts	R <sub>DS(ON)</sub> Ohms	I <sub>D(Cont)</sub> Amps	Part Number	Package Style	
<b>C3 TECHNOLOGY</b>					
900	0.120	36	APT36N90BC3G	TO-247	
800	0.450	11	APT11N80KC3G	TO-220	
	0.450	11	APT11N80BC3G	TO-247	
	0.145	34	APT34N80B2C3G	T-MAX® or TO-264	
	0.145	34	APT34N80LC3G	TO-264	
650	0.035	94	APT94N65B2C3G	T-MAX® or TO-264	
	0.070	47	APT47N65BC3G	TO-247 or D <sup>3</sup>	
600	0.070	47	APT47N60BC3G	TO-247 or D <sup>3</sup>	
	0.035	77	APT77N60JC3	ISOTOP®	
	0.042	94	APT94N60L2C3G	264-MAX™	
	<b>COOLMOS FREDFETS</b>				
600	0.083	40	APT47N60BCFG	TO-247	
	<b>SERVER SERIES</b>				
	0.045	60	APT60N60BCSG	TO-247	
<b>NEW! C6 TECHNOLOGY</b>					
600	0.041	77	APT77N60BC6	TO-247 or D3	
	0.070	53	APT53N60BC6	TO-247 or D3	
	0.099	38	APT38N60BC6	TO-247 or D3	
	0.125	30	APT30N60KC6	TO-220	
	0.125	30	APT30N60BC6	TO-247 or D3	
	0.035	106	APT106N60B2C6	T-MAX™ or TO-264	
650	0.041	85	APT97N65B2C6	T-MAX™ or TO-264	
	0.021	140	APT140N65JC6	ISOTOP	



\*COOLMOS™ comprise a new family of transistors developed by Infineon Technologies AG.  
\*COOLMOS™ is a trademark of Infineon Technologies AG

**Linear MOSFETs**

**What is a Linear MOSFET?**

A MOSFET specifically designed to be more robust than a standard MOSFET when operated with both high voltage and high current near DC conditions (>100msecs).

**The Problem with SMPS MOSFETs**

MOSFETs optimized for high frequency SMPS applications have poor high voltage DC SOA. Most SMPS type MOSFETs over-state SOA capability at high voltage on the data sheets. Above ~30V and DC conditions, SOA drops faster than is indicated by P<sub>D</sub> limited operation.

For pulsed loads (t<10ms) there is generally no problem using a standard MOSFET.

**Technology Innovation**

Introduced in 1999, Microsemi modified its proprietary patented self-aligned metal gate MOSFET technology for enhanced performance in high voltage, linear applications. These Linear MOSFETs typically provide 1.5-2.0 times the DC SOA capability at high voltage compared to other MOSFET technologies optimized for switching applications.

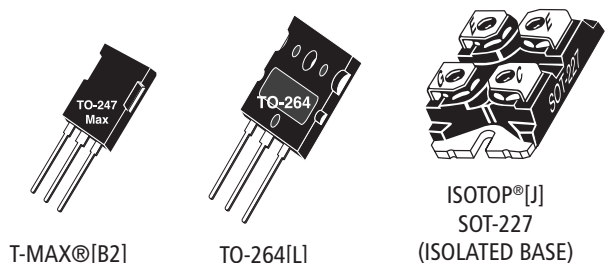
**Designers will need Linear MOSFETs when...**

- High Current & > 200V >100msec
- Used as a variable power resistor
- Soft start application (limit surge currents)
- Linear amplifier circuit

**Typical Applications...**

- Active loads above 200 volts such as DC dynamic loads for testing power supplies, batteries, fuel cells, etc.
- High voltage, high current constant current sources.

BV <sub>DSS</sub> Volts	R <sub>DS(ON)</sub> Ohms	I <sub>D(Cont)</sub> Amps	SOA Watts	Part Number
1000	0.600	18	325	APL1001J
600	0.125	49	325	APL602B2G
	0.125	43	325	APL602J
500	0.090	58	325	APL502B2G
	0.090	52	325	APL502J

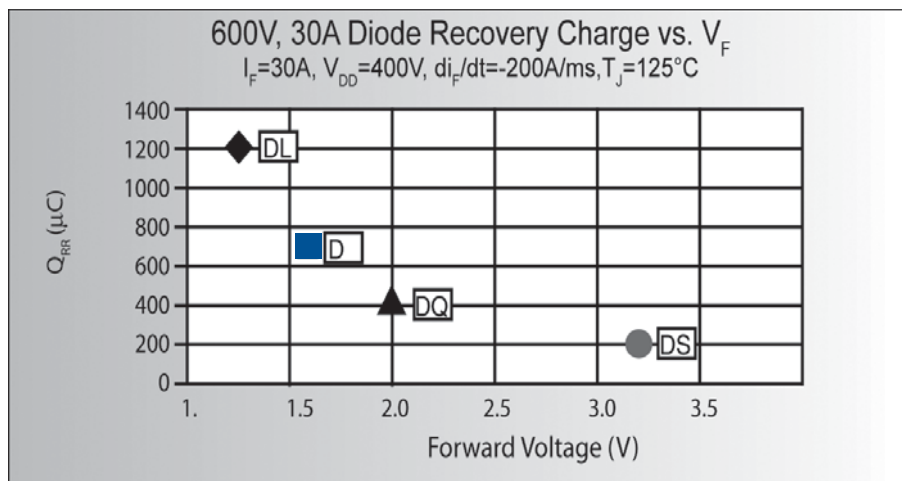


Part Numbers for TO-264 packages - replace "B2" with "L" in part number



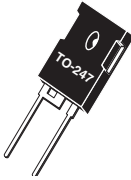


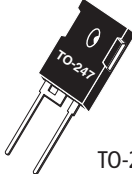
Microsemi PPG offers five series of discrete diode products: a new DL series low  $V_F$  ultra-soft recovery, the medium speed medium  $V_F$  D series, the high speed DQ series, the very high speed DS series, and the silicon Schottky S series. These series of diodes are designed to provide high quality solutions to a wide range of high voltage, high power application requirements, ranging from fast recovery for continuous conduction mode power factor correction to low conduction loss for output rectification. Distinguishing features, technology used, and applications for each product family are summarized in the table below.

Series	Voltage Ratings	Features	Applications	Comment
DL	600	Low $V_F$ Ultra-soft recovery Avalanche Rated	Output rectifier Resonant circuits	Ultra-soft recovery minimizes or eliminates snubber
D	200, 300, 400, 600, 1000, 1200	Medium $V_F$ Medium Speed	Freewheeling Diode Output rectifier DC-DC converter	Proprietary platinum process
DQ	600, 1000, 1200	High speed Avalanche Rated	PFC Freewheeling Diode DC-DC converter	Stepped epi improves softness Proprietary platinum process
DS	600	Very high speed	High frequency PFC	Proprietary platinum process
Schottky	200	Low $V_F$ Avalanche rated	Output rectifier Freewheeling Diode DC-DC converter	

The graph below shows the relative recovery speed and forward voltage positions of 600V DL, D, DQ and DS series diodes.



# Ultra Fast Recovery Diodes

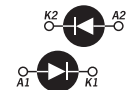
Volts	$I_{F(avg)}$ Amps	$V_F$ (volts) Typ 25°C	$t_{RR}$ (ns) Typ 25°C	$Q_{RR}$ (nC) Typ 125°C at $I_F = I_{F(avg)}$	Diode Series	Part Number	Package Style	
<b>SINGLE</b>	15	2.8	21	960	DQ	APT15DQ120BG	TO-247	 TO-220[K]
1200	15	2.8	21	960	DQ	APT15DQ120KG	TO-220	
	15	2.0	32	1300	D	APT15D120BG	TO-247	
	15	2.0	32	1300	D	APT15D120KG	TO-220	
	30	2.8	24	1800	DQ	APT30DQ120BG	TO-247	
	30	2.8	24	1800	DQ	APT30DQ120KG	TO-220	
	30	2.0	31	3450	D	APT30D120BG	TO-247	
	40	2.8	26	2200	DQ	APT40DQ120BG	TO-247	
	60	2.8	30	2800	DQ	APT60DQ120BG	TO-247	
	60	2.0	38	4000	D	APT60D120BG	TO-247	
	75	2.8	32	3340	DQ	APT75DQ120BG	TO-247	
1000	15	2.5	20	810	DQ	APT15DQ100BG	TO-247	 D³ PAK[S] TO-268
	15	2.5	20	810	DQ	APT15DQ100KG	TO-220	
	15	1.9	28	1550	D	APT15D100KG	TO-220	
	30	2.5	22	1250	DQ	APT30DQ100BG	TO-247	
	30	2.5	22	1250	DQ	APT30DQ100KG	TO-247	
	30	1.9	29	2350	D	APT30D100BG	TO-247	
	40	2.5	24	1430	DQ	APT40DQ100BG	TO-247	
	60	2.5	29	2325	DQ	APT60DQ100BG	TO-247	
	60	1.9	34	3600	D	APT60D100BG	TO-247	
	75	2.5	33	2660	DQ	APT75DQ100BG	TO-247	
600	8	2.0	14	160	DQ	APT8DQ60KG	TO-220	 TO-247[B]
	15	2.0	16	250	DQ	APT15DQ60BG	TO-247	
	15	2.0	16	250	DQ	APT15DQ60KG	TO-220	
	15	1.6	21	520	D	APT15D60BG	TO-247	
	15	1.6	21	520	D	APT15D60KG	TO-220	
	30	2.0	19	400	DQ	APT30DQ60BG	TO-247	
	30	2.0	19	400	DQ	APT30DQ60KG	TO-220	
	30	1.6	23	700	D	APT30D60BG	TO-247	
	30	1.25	35	3800	DL	APT30DL60BG	TO-247	
	40	2.0	22	480	DQ	APT40DQ60BG	TO-247	
	60	2.0	26	640	DQ	APT60DQ60BG	TO-247	
	60	1.6	40	920	D	APT60D60BG	TO-247	
	75	2.0	29	650	DQ	APT75DQ60BG	TO-247	
	75	1.25	42	3800	DL	APT75DL60BG	TO-247	
	100	1.25	45	3800	DL	APT100DL60BG	TO-247	
	150	1.25	53	3800	DL	APT150DL60B2G	T-MAX®	
400	30	1.3	22	360	D	APT30D40BG	TO-247	 TO-247 Max
	60	1.3	30	540	D	APT60D40BG	TO-247	
200	30	1.1	21	150	D	APT30D20BG	TO-247	 T-MAX®[B2]
	30	0.83	25	448	Schottky	APT30S20BG	TO-247	
	60	1.1	30	250	D	APT60D20BG	TO-247	
	60	0.83	35	490	Schottky	APT60S20BG	TO-247	
	100	0.89	40	690	Schottky	APT100S20BG	TO-247	
<b>TANDEM, DS DIODES FOR PFC BOOST APPLICATIONS</b>								Part Numbers for D³ packages - replace "B" with "S" in part number
600	15	3.2	13	85	DS	APT15DS60BG	TO-247	
	30	3.2	17	180	DS	APT30DS60BG	TO-247	
(2, 300V Diodes Connected In Series)								 TO-247[B]

# Ultra Fast Recovery Diodes

Volts	I <sub>F (avg)</sub> Amps	V <sub>F</sub> (volts) Typ 25°C	t <sub>RR</sub> (ns) Typ 25°C	Q <sub>RR</sub> (nC) Typ 125°C at I <sub>F</sub> = I <sub>F (avg)</sub>	Diode Series	Part Number	Package Style	
1200	DUAL	2x27	2.0	31	3450	D	APT2X30D120J	ISOTOP®
		2x30	2.6	25	1800	DQ	APT2X30DQ120J	
		2x53	2.0	38	4000	D	APT2X60D120J	
		2x60	2.5	30	2890	DQ	APT2X60DQ120J	
		2x93	2.0	47	5350	D	APT2X100D120J	
		2x100	2.4	45	5240	DQ	APT2X100DQ120J	
1000		2x28	1.9	29	2350	D	APT2X30D100J	
		2x55	1.9	34	3600	D	APT2X60D100J	
		2x60	2.2	30	2350	DQ	APT2X60DQ100J	
		2x95	1.9	43	4050	D	APT2X100D100J	
		2x100	2.1	45	3645	DQ	APT2X100DQ100J	
600		2x30	1.8	20	400	DQ	APT2X30DQ60J	
		2x30	1.6	23	700	D	APT2X30D60J	
		2x60	1.7	27	650	DQ	APT2X60DQ60J	
		2x60	1.6	40	920	D	APT2X60D60J	
		2x100	1.6	30	980	DQ	APT2X100DQ60J	
		2x100	1.6	34	1450	D	APT2X100D60J	
		2x150	1.25	53	3800	DL	APT2X150DL60J	
400		2x30	1.3	22	360	D	APT2X30D40J	
		2x60	1.3	30	540	D	APT2X60D40J	
		2x100	1.3	37	1050	D	APT2X100D40J	
		2x100	1.0	40	3550	DL	APT2X101DL40J <sup>++</sup>	
300		2x100	1.2	36	650	D	APT2X101D30J	
200		2x30	0.80	25	448	Schottky	APT2X31S20J	
		2x60	0.83	35	490	Schottky	APT2X61S20J	
		2x100	1.1	39	840	D	APT2X100D20J	
		2x100	0.89	40	690	Schottky	APT2X101S20J	
1200		2x30	2.8	26	2100	DQ	APT30DQ120BCTG	TO-247 [BCT]
1000		2x15	2.5	20	810	DQ	APT15DQ100BCTG	TO-247 [BCT]
		2x15	1.9	28	1550	D	APT15D100BCTG	TO-247 [BHB]
		2x30	1.9	29	2360	D	APT30D100BCTG	TO-247 [BHB]
		2x30	1.9	30	2350	D	APT30D100BHBG	TO-247 [BCA]
		2x60	2.5	29	2325	DQ	APT60DQ100LCTG	TO-264 [LCT]
		2x60	1.9	35	3600	D	APT60D100LCTG	TO-264 [LCT]
600		2x15	1.6	21	520	D	APT15D60BCTG	TO-247
		2x15	2.0	15	250	DQ	APT15DQ60BCTG	TO-247 [BCT]
		2x15	1.6	20	520	D	APT15D60BCAG	TO-247 [BCA]
		2x30	2.0	22	480	DQ	APT30DQ60BHBG	TO-247 [BHB]
		2x30	2.0	19	400	DQ	APT30DQ60BCTG	TO-247 [BCT]
		2x30	1.6	23	700	D	APT30D60BCTG	TO-247 [BCT]
		2x30	1.6	25	700	D	APT30D60BHBG	TO-247 [BHB]
		2x30	1.6	25	700	D	APT30D60BCAG	TO-247 [BCA]
		2x30	1.25	35	3800	DL	APT30DL60BCTG	TO-247 [BCT]
		2x40	2.0	22	480	DQ	APT40DQ60BCTG	TO-247 [BCT]
400		2x60	2.0	26	640	DQ	APT60DQ60BCTG	TO-247 [BCT]
		2x60	1.6	30	920	D	APT60D60LCTG	TO-264 [LCT]
		2x30	1.3	22	360	D	APT30D40BCTG	TO-247 [BCT]
300		2x60	1.3	30	540	D	APT60D40LCTG	TO-264 [LCT]
		2x30	1.2	25	1300	D	APT30D30BCTG	TO-247 [BCT]
200		2x30	1.1	21	150	D	APT30D20BCTG	TO-247 [KCT]
		2x30	1.1	21	150	D	APT30D20BCAG	TO-247 [BCA]
		2x30	0.80	25	448	Schottky	APT30S20BCTG	TO-247 [BCT]
		2x60	0.83	35	490	Schottky	APT60S20B2CTG	T-MAX® [B2CT]
		2x100	0.89	40	690	Schottky	APT100S20LCTG	TO-264[LCT]

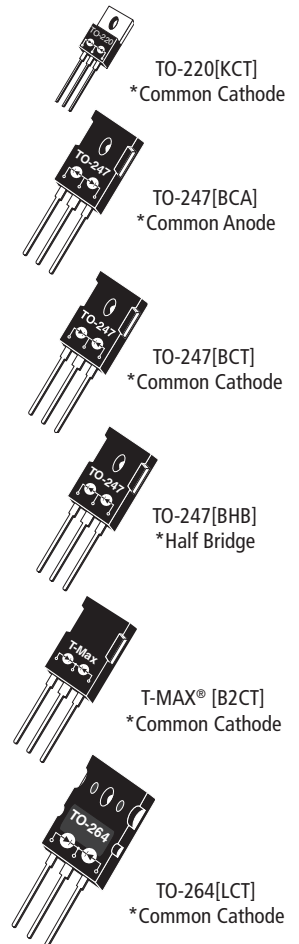


ISOTOP®[J] SOT-227  
Antiparallel  
Configuration  
(ISOLATED BASE)



Part Numbers for Parallel  
Configuration replace 30, 60,  
or 100 with 31, 61, or 101.  
Except Schottky

Example: 2X30D120J  
becomes 2X31D120J



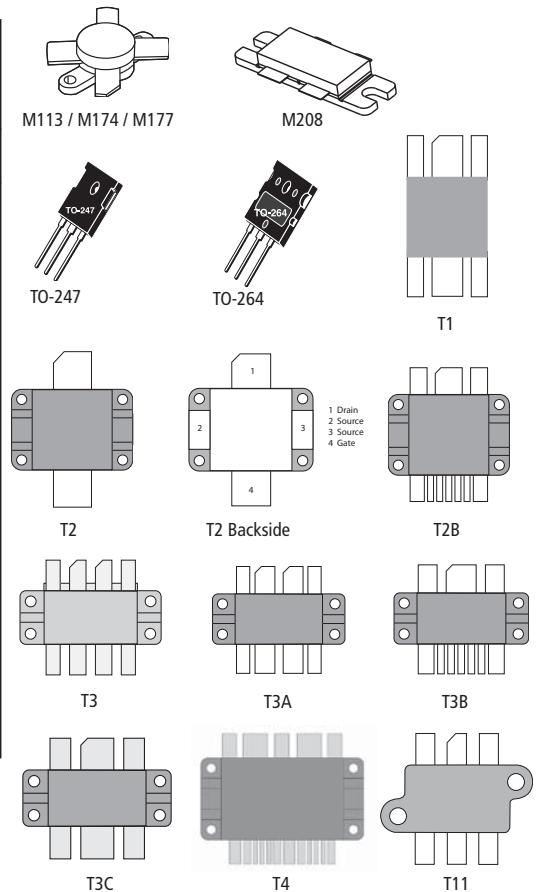
\*Current ratings per leg ++ Parallel Form Only

# High Voltage RF MOSFETs

The ARF family of RF Power MOSFETs are optimized for applications requiring frequencies as high as 150MHz and operating voltages as high as 400V. Historically, RF Power MOSFETs were limited to applications of 50V or less. This limitation has been removed by combining Microsemi's high voltage MOSFET technology with RF specific die geometries.

Why Higher Voltage? Higher  $V_{DD}$  means higher load impedance. For 150W output from a 50V supply the load impedance is only 8 ohms. At 125V, the load impedance is 50 ohms. The higher impedance allows simpler transformers and combiners. Paralleled devices can still operate into reasonable and convenient impedances. The increased operating voltage also lowers the DC current required for any given power output increasing efficiency and reducing the size, weight and cost of other system components.

Pout (W)	Freq. (MHz)	$V_{DD}/BV_{DSS}$ (V)	$\theta_{JC}$ ( $^{\circ}C/W$ )	Package Style	Part Number	Class of Operation
90	120	150V/450V	0.76	TO-247	ARF449AG/BG	C-E
100	100	125V/500V	0.70	TO-247	ARF463AG/BG	A-E
	100	125V/500V	0.70	TO-247	ARF463AP1G/BP1G	A-E
140	65	250V/900V	0.55	TO-247	ARF446G	C-E
	65	250V/900V	0.55	TO-247	ARF447G	C-E
	65	150V/450V	0.55	TO-247	ARF448AG/BG	C-E
150	65	125V/500V	0.50	TO-247	ARF460AG/BG	A-E
	65	250V/1kV	0.50	TO-247	ARF461AG/BG	A-E
	60	300V/1.2kV	0.50	TO-247	ARF465AG/BG	A-E
150	150	165V/500V	0.60	M174	ARF521	A-E
300	150	165V/500V	0.35	M208	ARF473	A-E
	150	165V/500V	0.31	T3A	ARF475FL	A-E
	150	165V/500V	0.31	T3C	ARF476FL	A-E
300	45	125V/500V	0.15	T11	ARF300	E
	45	-125V/-500V	0.15	T11	ARF301	E
	45	200V/1kV	0.35	TO-264	ARF466AG/BG	A-E
	45	200V/1kV	0.13	T3	ARF466FL	A-E
400	65	165V/500V	0.18	T3C	ARF477FL	A-E
750	25	250V/1000V	0.13	T2	ARF1519	A-E
750	40	125V/500V	0.12	T1	ARF1500	A-E
	40	250V/1kV	0.12	T1	ARF1501	A-E
	40	300V/1.2kV	0.12	T1	ARF1505	A-E
750	40	400V/1000V	0.12	T1	ARF1510	D
	40	380V/500V	0.12	T1	ARF1511	D



## Drivers and Driver-RF MOSFET Hybrids

The DRF1200/01/02/03 Hybrids integrates Driver, bypass capacitors and RF MOSFETs into a single package. Integration maximizes amplifier performance by minimizing transmission line parasitics between the Driver and MOSFET. The DRF1300 or DRF1301 has two independent channels, each containing a Driver and RF MOSFET in a push pull configuration. The DRF1400A and B are half bridge hybrids with symmetrically orientated leads so that the two can easily be configured into a full bridge converter. All DRF parts feature a proprietary Anti-ring function to eliminate cross conduction in a Bridge or push-pull topologies. All DRF parts can be externally selected in either an inverting or non-inverting configuration.

$P_D$ (W)	Freq. (MHz)	$V_{DD}/BV_{DSS}$ (V)	$\theta_{JC}$ ( $^{\circ}C/W$ )	Package Style	Part Number	Class of Operation	Description
600	30	15V/1000V	1.00	T2B	DRF1200	D-E	Driver and High Voltage RF MOSFET
1060	30	15V/1000V	.025	T2B	DRF1201	D-E	Driver and High Voltage/High Power RF MOSFET
1060	30	15V/500V	.025	T2B	DRF1202	D-E	Driver and High Power RF MOSFET
600	30	15V/1000V	0.09	T2B	DRF1203	D-E	Driver and High Voltage RF MOSFET
1000	30	15V/500V	0.06	T4	DRF1300	D-E	2 Drivers/RF MOSFETs in Push-Pull Configuration
1000	30	15V/1000	0.06	T4	DRF1301	D-E	2 Drivers/RF MOSFETs in Push-Pull Configuration
1500	30	15V/500	0.06	T4	DRF1400A/B	D-E	2 Drivers/RF MOSFETs in a H Bridge Configuration

## High Frequency RF MOSFETs

The VRF family of RF MOSFETs are improved replacements for industry standard RF transistors. They provide improved ruggedness by increasing the  $BV_{DSS}$  over 30% from the industry standard of 125 volts to 170V minimum. Low cost flangeless packages are another improvement that show Microsemi's dedication to optimizing performance, reducing cost and improving reliability. We will continue to offer a greater number of product offerings in the new reduced-cost flangeless packages.

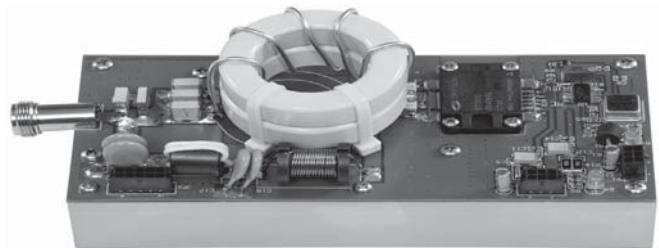
Pout Min (W)	Freq. (MHz)	Gain Typ (dB)	$\eta$ Typ (%)	$V_{DD}/BV_{DSS}$ (V)	Coss Typ (pF)	VSWR Load	$\theta_{JC}$ ( $^{\circ}C/W$ )	Case Style	Part Number
150	175	13	45	28V/80V	375	30:1	0.60	M174	VRF141
30	175	16	50	50V/170V	40	30:1	1.52	M113	VRF148A
150	150	11	50	50V/170V	210	30:1	0.60	M174	VRF150
150	175	14	50	50V/170V	200	30:1	0.60	M174	VRF151
150	175	14	50	50V/170V	200	30:1	0.45	M174A	VRF151E
300	175	14	55	28/80	375	5:1	0.35	M208	VRF141G
300	175	16	55	50V/170V	200	5:1	0.35	M208	VRF151G
150	175	14	50	50V/130V	215	30:1	0.60	M174	VRF152
150	175	14	50	50V/130V	215	30:1	0.45	M174A	VRF152E
600	30	17	45	50V/170V	775	-	0.13	T2	VRF154FL
600	30	21	45	50V/170V	810	-	0.13	T2	VRF157FL
150	150	14	50	100V/270V	80	5:1	0.60	M174	VRF190
150	150	14	50	100V/270V	80	5:1	0.45	M174A	VRF190E
150	150	22	50	100V/270V	80	5:1	0.40	T11	VRF191
300	30	21	50	50V/170V	400	3:1	0.27	M177	VRF2933

## Reference Design Kits

DRF1200/CLASS-E, 13.56 MHz

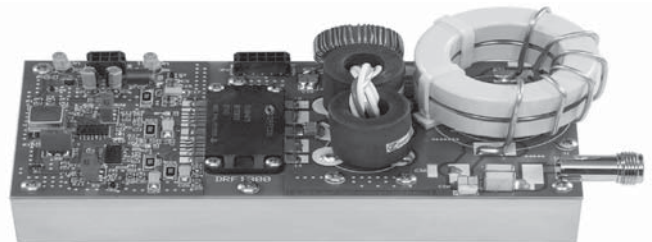
DRF1200/CLASS-E, 27.12 MHz

The DRF1200/CLASS-E Single Ended RF Generator is a reference design providing the designer the ability to evaluate an 85% efficient 1000W CLASS-E RF Generator



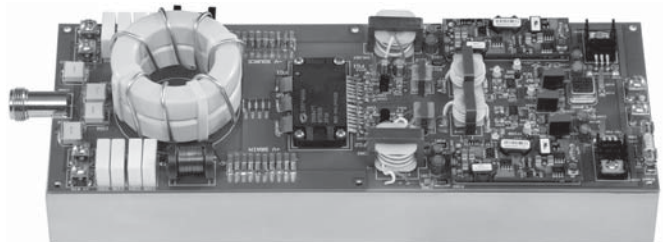
DRF1300/CLASS-D, 13.56 MHz

The DRF1300/CLASS-D Push Pull RF Generator is a reference design providing the designer the ability to evaluate an 80% efficient 2000W CLASS-D RF Generator



DRF1400/CLASS-D, 13.56 MHz

The DRF1400/CLASS-D Half Bridge RF Generator is a reference design providing the designer the ability to evaluate an 85% efficient 2500W CLASS-D RF Generator



All kits include: A fully populated board attached to an aluminum heat sink. An extensive application note explaining the theory of operation with designers recommendations for evaluation and board layout. All key waveforms are illustrated and described. A complete parts list with recommended vendor part numbers and the board's Gerber file are provided for an easy transition into an end application.

# POWER MODULES

Microsemi combines a formidable array of technologies in semiconductors, packaging, and automated manufacturing to produce a wide range of high quality modules optimized for:

- Reliability
- Efficiency and electrical performance
- Low cost
- Space savings
- Reduced assembly time



The readily available standard module product line spans a wide selection of circuit topologies, semiconductors including Silicon Carbide, voltage and current ratings, and packages. If you need even more flexibility or intellectual property protection, Microsemi can often customize a standard power module with no setup cost and with a short lead time. Unique requirements can be met with Application Specific Power Modules (ASPM®).

Microsemi serves a broad spectrum of industrial applications for Welding, Solar, Induction Heating, Medical, UPS, Motor Control and SMPS markets as well as High-Rel applications for SemiCap, Defense and Aerospace markets. A wide selection of construction materials enables Microsemi to manufacture with short lead times modules that feature:

- Extended temperature range: -60°C to +200°C
- Reduced size and weight
- Extended reliability
- Hi-Rel testing and screening options

Microsemi's experience and expertise in power electronic conversion brings the most effective technical support for your new development, including:

- Isolated gate driver & supply
- Short circuit protection
- Snubbers
- Temperature & current sensing
- Mix & match semiconductors
- Parameter binning

## Power Module Part Numbering System

### IGBT Modules

APT	GL	475	A	120	T	D3	G
I	II	III	IV	V	VI	VII	VIII

I Trade Mark

II **IGBT Type:**  
 GF = NPT or NPT FAST  
 GFQ = NPT ULTRA FAST  
 GL = TRENCH 4  
 GT = TRENCH 3  
 GV = Mix NPT/TRENCH  
 CV = Mix TRENCH/CoolMOS

III **Current:**  
 Ic @ Tc=80°C

IV **Topology:**  
 A = Phase Leg  
 BB = Boost Buck  
 DA = Boost Chopper  
 DDA = Double Boost Chopper  
 DH = Asymmetrical Bridge  
 DSK = Double Buck Chopper  
 DU = Dual Common Source  
 H = Full Bridge  
 SDA = Double Boost + Bypass Diode  
 SK = Buck Chopper  
 TA = Triple Phase Leg  
 TDU = Triple Dual Common Source  
 TL = Three Level  
 U = Single Switch  
 VDA = Interleaved PFC  
 X = Three Phase Bridge

V **Blocking Voltage:**  
 60 = 600V  
 120 = 1200V  
 170 = 1700V

VI **Option:**  
 D = Series Diode  
 T = Temperature Sensor  
 W = Clamping Parallel Diode

VII **Package:**  
 1 = SP1  
 2 = SP2  
 3 = SP3  
 P = SP6-P  
 D1 = D1 (34mm)  
 D3 = D3 (62mm)  
 D4 = D4 (62mm)

VIII G = RoHS Compliant

### MOSFET Modules

APT	C	60	DA	M24	T	1	G
I	II	III	IV	V	VI	VII	VIII

I Trade Mark

II **MOSFET Type:**  
 M = MOSFET  
 C = CoolMOS

III **Blocking Voltage:**  
 08 = 75V                      80 = 800V  
 10 = 100V                    90 = 900V  
 20 = 200V                    100 = 100V  
 50 = 500V                    120 = 120V  
 60 = 600V

IV **Topology:**  
 A = Phase Leg  
 BB = Boost Buck  
 DA = Boost Chopper  
 DDA = Double Boost Chopper  
 DH = Asymmetrical Bridge  
 DSK = Double Buck Chopper  
 DU = Dual Common Source  
 H = Full Bridge  
 SDA = Double Boost + Bypass Diode  
 SK = Buck Chopper  
 TA = Triple Phase Leg  
 TDU = Triple Dual Common Source  
 U = Single Switch  
 VDA = Interleaved PFC

V **RDSON @ Tc=25°C**  
 240 = 2400mΩ  
 24 = 240mΩ  
 M24 = 24mΩ

VI **Option:**  
 A = AIN Substrate  
 C = SiC Diode  
 D = Series Diode  
 F = FREDFET  
 S = Series and Parallel Diodes  
 T = Temperature Sensor  
 U = Ultrafast FREDFET

VII **Package:**  
 1 = SP1  
 2 = SP2  
 3 = SP3  
 P = SP6-P

VIII G = RoHS Compliant

### Diode Modules

APT	DR	90	X	160	1	G
I	II	III	IV	V	VI	VII

I Trade Mark

II **Diode Type:**  
 DF = FRED  
 DR = Standard Rectifier  
 DC = SiC  
 DSK = Schottky

III **Current:**  
 IF @ Tc=80°C

IV **Topology:**  
 AA = Dual Common Anode  
 BB = Boost Buck  
 AK = Dual Series  
 KK = Dual Common Cathode  
 H = Single Phase Bridge  
 U = Single Switch  
 X = Three Phase Bridge

V **Blocking Voltage:**  
 20 = 200V  
 40 = 400V  
 60 = 600V  
 100 = 1000V  
 120 = 1200V  
 160 = 1600V  
 170 = 1700V

VI **Package:**  
 1 = SP1  
 3 = SP3

VII G = RoHS Compliant

### Optional Materials

Optional materials are available upon demand on most of the listed standard power modules. Options are indicated with a letter in the suffix of the module part number. Temperature Sensor Option is indicated in the catalog with "YES" or "option" when available on standard part or on demand.

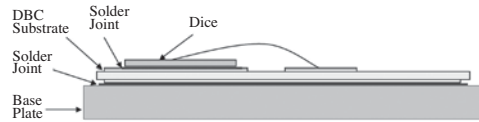
- A** AIN Substrate for higher thermal conductivity
- M** AlSiC Base plate material for improved temperature cycling capabilities
- T** Temperature Sensor (NTC or PTC) for Case Temperature information
- C** SiC Diode for higher efficiency



# PERFORMANCE & THERMAL MANAGEMENT

While the choice of power semiconductors play a key role in power conversion applications, the increased demand for higher power density and assembly reliability become the objective to keep the leadership on the market place.

With 28 years experience in power module industry Microsemi develops and manufactures power modules with mix and match components and assembly materials to offer the best trade off between cost, size, performance and reliability. Microsemi has the right expertise to address your application.



	CTE (ppm/K)	Thermal conductivity (W/m.K)	Rthjc (K/W)
Silicon Die (120 mm <sup>2</sup> )	4	136	
Cu/Al <sub>2</sub> O <sub>3</sub>	17/7	390/25	0.35
AlSiC/Al <sub>2</sub> O <sub>3</sub>	7/7	170/25	0.38
Cu/AlN	17/5	390/170	0.28
AlSiC/AlN	7/5	170/170	0.31
AlSiC/Si <sub>3</sub> N <sub>4</sub>	7/3	170/60	0.31

	Material	CTE (ppm/K)	Thermal conductivity (W/m.K)	Density (g/cc)
Base plate	CuW	6.5	190	17
	AlSiC	7	170	2.9
	Cu	17	390	8.9
Substrate	Al <sub>2</sub> O <sub>3</sub>	7	25	-
	AlN	5	170	-
	Si <sub>3</sub> N <sub>4</sub>	3	60	-
Die	Si	4	136	-
	SiC	2.6	270	-

The choice of materials determines power module performance and reliability:

- Using materials with more closely matched values of Thermal Coefficient Expansion (TCE) increases module lifetime
- Higher thermal conductivity maximizes thermal performance

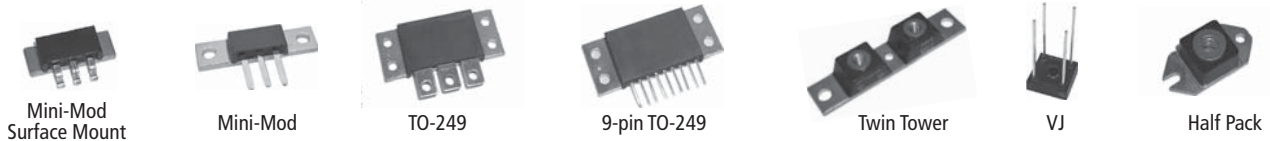
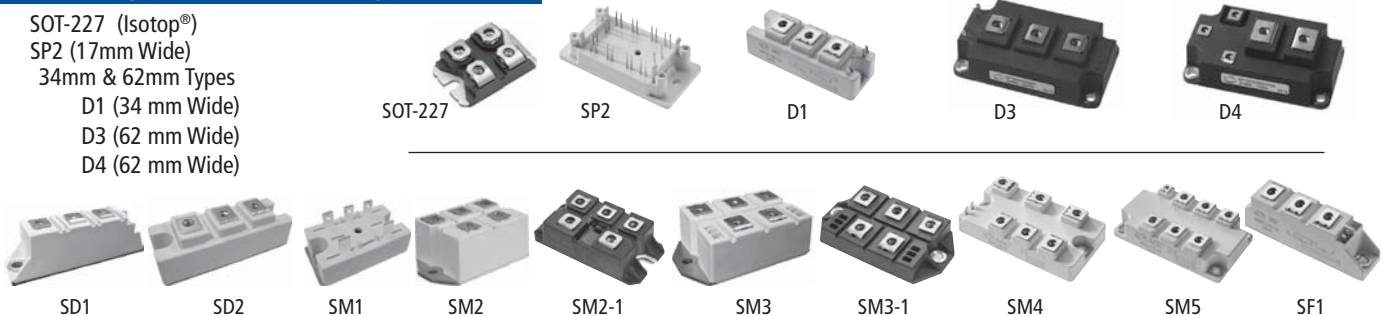
## Improved Low Profile Packages

- SP1 (12mm)
- SP3 (12mm)
- SP4 (17mm)
- SP6 (17mm)
- SP6-P (12mm)

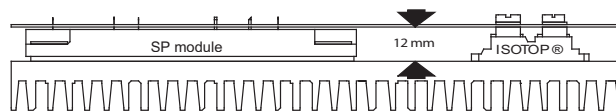


## Industry Standard Packages

- SOT-227 (Isotop®)
- SP2 (17mm Wide)
- 34mm & 62mm Types
- D1 (34 mm Wide)
- D3 (62 mm Wide)
- D4 (62 mm Wide)



## Package Advantages



- SP1 package:**
- Replaces 2 SOT-227 parts
  - Improved assembly and cost
  - Height compatible with SOT-227
  - Copper base plate



- SP3 package:**
- Replaces up to 4 SOT-227 parts
  - Reduced assembly time and cost
  - Height compatible with SOT-227
  - Copper base plate



- 30 mm**
- 17 mm**
- SP6 package offers the same footprint and the same pinout location as the popular 62mm package but with lower height, leading to:**
- Reduced stray inductance
  - Reduced parasitic resistance
  - Higher efficiency at high frequency



- SP6-P package:**
- Replaces up to 6 SOT-227 parts
  - Height compatible with SOT-227
  - Low inductance solder pins
  - High current capability

# IGBT Power Modules

## CHOPPER AND PHASE LEG

$V_{CES}$ (V)	IGBT type	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ (V) at rated $I_c$	Package	NTC			
600	NPT	250	2.1	D3	option	APTF250DA60D3G	APTF250SK60D3G	APTF250A60D3G
		330	2.1	D3	option	APTF330DA60D3G	APTF330SK60D3G	APTF330A60D3G
	NPT FAST	30	2.1	SOT227	-	APT30GF60JU2	APT30GF60JU3	N/A
		30	2.1	SP1	YES	N/A	N/A	APTF30A60T1G
		50	2.1	SOT227	-	APT50GF60JU2	APT50GF60JU3	N/A
		50	2.1	SP1	YES	N/A	N/A	APTF50A60T1G
		60	2.1	SOT227	-	APT60GF60JU2	APT60GF60JU3	N/A
		90	2.1	SP1	YES	APTF90DA60T1G	APTF90SK60T1G	APTF90A60T1G
		90	2.1	SP3	YES	APTF90DA60T3AG	APTF90SK60T3AG	APTF90A60T3AG
		100	2.1	SOT227	-	APT100GF60JU2	APT100GF60JU3	N/A
		150	2.1	SP3	YES	N/A	N/A	APTF150A60T3AG
		165	2.1	D1	-	APTF165DA60D1G	APTF165SK60D1G	APTF165A60D1G
		180	2.1	SP4	YES	APTF180DA60TG	APTF180SK60TG	APTF180A60TG
		250	2.1	D3	option	APTF250DA60D3G	APTF250SK60D3G	APTF250A60D3G
		330	2.1	D3	option	APTF330DA60D3G	APTF330SK60D3G	APTF330A60D3G
		350	2.1	SP6	option	APTF350DA60G	APTF350SK60G	APTF350A60G
	TRENCH 3	20	1.5	SP1	YES	N/A	N/A	APTGT20A60T1G
		30	1.5	SP1	YES	N/A	N/A	APTGT30A60T1G
		50	1.5	SP1	YES	N/A	N/A	APTGT50A60T1G
		75	1.5	SP1	YES	APTGT75DA60T1G	APTGT75SK60T1G	APTGT75A60T1G
		75	1.5	SP2	-	N/A	N/A	APTGT75A602G
		100	1.5	SP1	YES	APTGT100DA60T1G	APTGT100SK60T1G	APTGT100A60T1G
		100	1.5	SP2	-	N/A	N/A	APTGT100A602G
		100	1.5	SP3	YES	APTGT100DA60T3AG	APTGT100SK60T3AG	APTGT100A60T3AG
		150	1.5	SP1	YES	APTGT150DA60T1G	APTGT150SK60T1G	APTGT150A60T1G
		150	1.5	SP2	-	N/A	N/A	APTGT150A602G
		150	1.5	SP3	YES	APTGT150DA60T3AG	APTGT150SK60T3AG	APTGT150A60T3AG
		200	1.5	SP2	-	N/A	N/A	APTGT200A602G
200		1.5	SP3	YES	APTGT200DA60T3AG	APTGT200SK60T3AG	APTGT200A60T3AG	
300		1.5	SP4	YES	N/A	N/A	APTGT300A60TG	
300		1.5	SP6	option	APTGT300DA60G	APTGT300SK60G	APTGT300A60G	
1200		NPT FAST	15	3.2	SP1	YES	N/A	N/A
	25		3.2	SP1	YES	N/A	N/A	APTF25A120T1G
	50		3.2	SP1	YES	APTF50DA120T1G	APTF50SK120T1G	APTF50A120T1G
	75		3.2	SP1	YES	APTF75DA120T1G	N/A	N/A
	100		3.2	SP1	YES	APTF100DA120T1G	N/A	N/A
	100		3.2	SP2	-	N/A	N/A	APTF100A1202G
	100		3.2	SP3	YES	N/A	N/A	APTF100A120T3AG
	100		3.2	SP4	YES	APTF100DA120TG	APTF100SK120TG	APTF100A120TG
	150		3.2	SP3	YES	N/A	N/A	APTF150A120T3AG
	150		3.2	SP4	YES	APTF150DA120TG	APTF150SK120TG	APTF150A120TG
	200		3.2	D3	option	APTF200DA120D3G	APTF200SK120D3G	APTF200A120D3G
	300		3.2	SP6	option	APTF300DA120G	APTF300SK120G	APTF300A120G
300	3.2	D3	option	APTF300DA120D3G	APTF300SK120D3G	APTF300A120D3G		
TRENCH 3	25	1.7	SP1	YES	N/A	N/A	APTGT25A120T1G	
	35	1.7	SP1	YES	N/A	N/A	APTGT35A120T1G	
	35	1.7	SOT227	-	APT35GT120JU2	APT35GT120JU3	N/A	
	50	1.7	SOT227	-	APT50GT120JU2	APT50GT120JU3	N/A	
	50	1.7	SP1	YES	N/A	N/A	APTGT50A120T1G	
	50	1.7	SP2	-	N/A	N/A	APTGT50A1202G	
	50	1.7	SP4	YES	APTGT50DA120TG	APTGT50SK120TG	APTGT50A120TG	
	75	1.7	SOT227	-	APT75GT120JU2	APT75GT120JU3	N/A	
75	1.7	SP1	YES	APTGT75DA120T1G	APTGT75SK120T1G	APTGT75A120T1G		

continued next page



NEW!

NEW!

NEW!

NEW!



NEW!

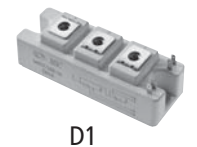


NEW!

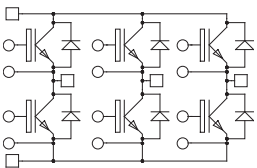


## CHOPPER AND PHASE LEG CONT.

$V_{CES}$ (V)	IGBT type	$I_C$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ (V) at rated $I_C$	Package	NTC	DA...or...U2	SK...or...U3	...A...	
1200	TRENCH 3	75	1.7	SP2	-	N/A	N/A	APTGT75A1202GNEW	
		75	1.7	SP4	YES	APTGT75DA120TG	APTGT75SK120TG	APTGT75A120TG	
		100	1.7	SP1	YES	APTGT100DA120T1G	N/A	N/A	
		100	1.7	SOT227	-	APT100GT120JU2	APT100GT120JU3	N/A	
		100	1.7	D1	-	APTGT100DA120D1G	APTGT100SK120D1G	APTGT100A120D1G	
		100	1.7	SP2	-	N/A	N/A	APTGT100A1202G <b>NEW!</b>	
		100	1.7	SP3	YES	N/A	N/A	APTGT100A120T3AG	
		100	1.7	SP4	YES	APTGT100DA120TG	APTGT100SK120TG	APTGT100A120TG	
		150	1.7	SP6	option	APTGT150DA120G	APTGT150SK120G	APTGT150A120G	
		150	1.7	D1	-	APTGT150DA120D1G	APTGT150SK120D1G	APTGT150A120D1G	
		150	1.7	SP2	-	N/A	N/A	APTGT150A1202G <b>NEW!</b>	
		150	1.7	SP3	YES	N/A	N/A	APTGT150A120T3AG	
		150	1.7	SP4	YES	APTGT150DA120TG	APTGT150SK120TG	APTGT150A120TG	
		200	1.7	SP6	option	APTGT200DA120G	APTGT200SK120G	APTGT200A120G	
		200	1.7	D3	option	APTGT200DA120D3G	APTGT200SK120D3G	APTGT200A120D3G	
		300	1.7	SP6	option	APTGT300DA120G	APTGT300SK120G	APTGT300A120G	
300	1.7	D3	option	APTGT300DA120D3G	APTGT300SK120D3G	APTGT300A120D3G			
400	1.7	SP6	option	APTGT400DA120G	APTGT400SK120G	APTGT400A120G			
400	1.7	D3	option	APTGT400DA120D3G	APTGT400SK120D3G	APTGT400A120D3G			
1700	TRENCH 4	40	1.85	SOT227	-	APT40GL120JU2	APT40GL120JU3	N/A	
		60	1.85	SOT227	-	APT60GL120JU2	APT60GL120JU3	N/A	
		60	1.85	SP1	YES	N/A	N/A	APTGL60A120T1G	
		90	1.85	SP1	YES	APTGL90DA120T1G	APTGL90SK120T1G	APTGL90A120T1G	
		120	1.85	SP1	YES	APTGL120DA120T1G	APTGL120SK120T1G	N/A	
		180	1.85	SP2	-	N/A	N/A	APTGL180A1202G <b>NEW!</b>	
		180	1.85	SP3	YES	N/A	N/A	APTGL180A120T3AG	
		325	1.85	D3	option	APTGL325DA120D3G	APTGL325SK120D3G	APTGL325A120D3G	
	475	1.85	D3	option	APTGL475DA120D3G	APTGL475SK120D3G	APTGL475A120D3G		
	700	1.85	D3	option	APTGL700DA120D3G	APTGL700SK120D3G	N/A <b>NEW!</b>		
	1700	TRENCH 3	30	2.0	SP1	YES	APTGT30DA170T1G	APTGT30SK170T1G	APTGT30A170T1G
			50	2.0	SP1	YES	APTGT50DA170T1G	APTGT50SK170T1G	APTGT50A170T1G
50			2.0	SP4	YES	APTGT50DA170TG	APTGT50SK170TG	APTGT50A170TG	
75			2.0	SP1	YES	APTGT75DA170T1G	N/A	N/A	
75			2.0	D1	-	APTGT75DA170D1G	APTGT75SK170D1G	APTGT75A170D1G	
100			2.0	SP4	YES	APTGT100DA170TG	APTGT100SK170TG	APTGT100A170TG	
150			2.0	SP6	option	APTGT150DA170G	APTGT150SK170G	APTGT150A170G	
200			2.0	D3	option	APTGT200DA170D3G	APTGT200SK170D3G	APTGT200A170D3G	
225			2.0	SP6	option	APTGT225DA170G	APTGT225SK170G	APTGT225A170G	
300			2.0	SP6	option	APTGT300DA170G	APTGT300SK170G	APTGT300A170G	
300	2.0	D3	option	APTGT300DA170D3G	APTGT300SK170D3G	APTGT300A170D3G			



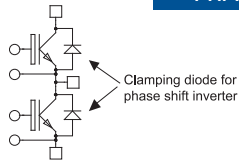
## 3 PHASE BRIDGE



$V_{CES}$ (V)	IGBT Type	$I_C$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ at rated $I_C$	Package	NTC	Part Number
600	NPT FAST	30	2.1	SP3	YES	APTGF30X60T3G
		50	2.1	SP3	YES	APTGF50X60T3G
	TRENCH 3	20	1.5	SP3	YES	APTGT20X60T3G
		30	1.5	SP3	YES	APTGT30X60T3G
		50	1.5	SP3	YES	APTGT50X60T3G
1200	NPT FAST	15	3.2	SP3	YES	APTGF15X120T3G
		25	3.2	SP3	YES	APTGF25X120T3G
	TRENCH 3	25	1.7	SP3	YES	APTGT25X120T3G
		35	1.7	SP3	YES	APTGT35X120T3G
		30	1.85	SP3	YES	APTGL30X120T3G
	TRENCH4	30	1.85	SP3	YES	APTGL30X120T3G
		40	1.85	SP3	YES	APTGL40X120T3G

# IGBT Power Modules

## PHASE LEG for welding application

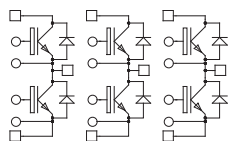


$V_{CES}$ (V)	IGBT Type	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ at rated $I_c$	Package	NTC	Part Number
1200	NPT FAST	50	3.2	SP3	YES	APTF50A120T3WG
		100	3.2	SP3	YES	APTF100A120T3WG
		150	3.2	SP3	YES	APTF150A120T3WG



SP3

## TRIPLE PHASE LEG



$V_{CES}$ (V)	IGBT Type	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ at rated $I_c$	Package	NTC	Part Number
600	NPT FAST	90	2.1	SP6-P	option	APTF90TA60PG
		50	1.5	SP6-P	option	APTF50TA60PG
	TRENCH 3	75	1.5	SP6-P	option	APTF75TA60PG
		100	1.5	SP6-P	option	APTF100TA60PG
		150	1.5	SP6-P	option	APTF150TA60PG
1200	NPT FAST	50	3.2	SP6-P	option	APTF50TA120PG
		75	1.7	SP6-P	option	APTF75TA120PG
	TRENCH 3	100	1.7	SP6-P	YES	APTF100TA120TPG
		120	1.85	SP6-P	YES	APTF120TA120TPG
1700	TRENCH 3	50	2.0	SP6-P	option	APTF50TA170PG

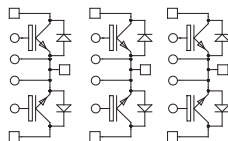


SP4

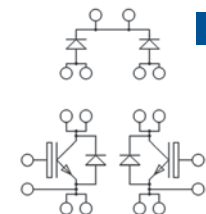


SP6-P

## TRIPLE DUAL COMMON SOURCE



$V_{CES}$ (V)	IGBT Type	$I_c$ (A) $V_{CE(ON)}$ $T_c=80^\circ\text{C}$	at rated $I_c$	Package	NTC	Part Number
600	NPT FAST	90	2.1	SP6-P	option	APTF90TDU60PG
		50	1.5	SP6-P	option	APTF50TDU60PG
	TRENCH 3	75	1.5	SP6-P	option	APTF75TDU60PG
		100	1.5	SP6-P	option	APTF100TDU60PG
		150	1.5	SP6-P	option	APTF150TDU60PG
1200	NPT FAST	50	3.2	SP6-P	option	APTF50TDU120PG
		75	1.7	SP6-P	option	APTF75TDU120PG
	TRENCH 3	100	1.7	SP6-P	YES	APTF100TDU120TPG
		120	1.85	SP6-P	YES	APTF120TDU120TPG
1700	TRENCH 3	50	2.0	SP6-P	option	APTF50TDU170PG



## INTERLEAVED PFC

$V_{CES}$ (V)	IGBT Type	$I_c$ (A) $V_{CE(ON)}$ $T_c=80^\circ\text{C}$	at rated $I_c$	Package	NTC	Part Number
600	NPT FAST	90	2.1	SP3	YES	APTF90VDA60T3G
		50	2.1	SP3	YES	APTF50VDA60T3G
1200	NPT FAST	50	3.2	SP3	YES	APTF50VDA120T3G

## DUAL CHOPPER

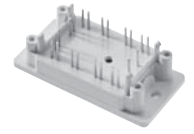
$V_{CES}$ (V)	IGBT type	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ at rated $I_c$	Package	NTC	...DDA...	...DSK...
600	NPT FAST	50	2.1	SP3	YES	APTF50DDA60T3G	APTF50DSK60T3G
		90	2.1	SP3	YES	APTF90DDA60T3G	APTF90DSK60T3G
	TRENCH 3	20	1.5	SP3	YES	APTF20DDA60T3G	APTF20DSK60T3G
		30	1.5	SP3	YES	APTF30DDA60T3G	APTF30DSK60T3G
		50	1.5	SP3	YES	APTF50DDA60T3G	APTF50DSK60T3G
		75	1.5	SP3	YES	APTF75DDA60T3G	APTF75DSK60T3G
1200	NPT FAST	25	3.2	SP3	YES	APTF25DDA120T3G	APTF25DSK120T3G
		50	3.2	SP3	YES	APTF50DDA120T3G	APTF50DSK120T3G
		75	3.2	SP4	YES	APTF75DDA120T3G	APTF75DSK120T3G
	TRENCH 3	50	1.7	SP3	YES	APTF50DDA120T3G	APTF50DSK120T3G
		60	1.85	SP3	YES	APTF60DDA120T3G	APTF60DSK120T3G
		90	1.85	SP3	YES	APTF90DDA120T3G	APTF90DSK120T3G

## FULL & ASYMMETRICAL BRIDGE

$V_{CES}$ (V)	IGBT type	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ at rated $I_c$	Package	NTC			
						...H...	...DH...	
600	NPT FAST	30	2.1	SP1	YES	APTGF30H60T1G	N/A	
		30	2.1	SP3	YES	APTGF30H60T3G	N/A	
		50	2.1	SP1	YES	APTGF50H60T1G	APTGF50DH60T1G	
		50	2.1	SP2	YES	APTGF50H60T2G	N/A	<b>NEW!</b>
		50	2.1	SP3	YES	APTGF50H60T3G	N/A	
		90	2.1	SP3	YES	APTGF90H60T3G	APTGF90DH60T3G	
		180	2.1	SP6	-	APTGF180H60G	APTGF180DH60G	
	TRENCH 3	20	1.5	SP1	YES	APTGT20H60T1G	N/A	
		20	1.5	SP3	YES	APTGT20H60T3G	N/A	
		30	1.5	SP1	YES	APTGT30H60T1G	N/A	
		30	1.5	SP3	YES	APTGT30H60T3G	N/A	
		50	1.5	SP1	YES	APTGT50H60T1G	APTGT50DH60T1G	
		50	1.5	SP2	YES	APTGT50H60T2G	N/A	<b>NEW!</b>
		50	1.5	SP3	YES	APTGT50H60T3G	N/A	
		75	1.5	SP1	YES	APTGT75H60T1G	APTGT75DH60T1G	
		75	1.5	SP2	YES	APTGT75H60T2G	N/A	<b>NEW!</b>
		75	1.5	SP3	YES	APTGT75H60T3G	APTGT75DH60T3G	
		100	1.5	SP4	YES	APTGT100H60TG	APTGT100DH60TG	
		100	1.5	SP3	YES	APTGT100H60T3G	APTGT100DH60T3G	
		150	1.5	SP4	YES	APTGT150H60TG	APTGT150DH60TG	
200	1.5	SP6	-	APTGT200H60G	APTGT200DH60G			
300	1.5	SP6	-	APTGT300H60G	APTGT300DH60G			
1200	NPT Ultra FAST	25	2.1	SP2	YES	APTGFQ25H120T2G	N/A	<b>NEW!</b>
	NPT FAST	15	3.2	SP1	YES	APTGF15H120T1G	N/A	
		15	3.2	SP3	YES	APTGF15H120T3G	N/A	
		25	3.2	SP1	YES	APTGF25H120T1G	N/A	
		25	2.1	SP2	YES	APTGFQ25H120T2G	N/A	<b>NEW!</b>
		25	3.2	SP3	YES	APTGF25H120T3G	N/A	
		50	3.2	SP3	YES	N/A	APTGF50DH120T3G	
		50	3.2	SP4	YES	APTGF50H120TG	APTGF50DH120TG	
		75	3.2	SP3	YES	N/A	APTGF75DH120T3G	
	75	3.2	SP4	YES	APTGF75H120TG	APTGF75DH120TG		
	150	3.2	SP6	-	APTGF150H120G	APTGF150DH120G		
	TRENCH 3	25	1.7	SP1	YES	APTGT25H120T1G	N/A	
		35	1.7	SP1	YES	APTGT35H120T1G	N/A	
		35	1.7	SP3	YES	APTGT35H120T3G	N/A	
		50	1.7	SP3	YES	N/A	APTGT50DH120T3G	
		50	1.7	SP4	YES	APTGT50H120TG	APTGT50DH120TG	
		50	1.7	SP3	YES	APTGT50H120T3G	N/A	
		75	1.7	SP3	YES	N/A	APTGT75DH120T3G	
		75	1.7	SP4	YES	APTGT75H120TG	APTGT75DH120TG	
		100	1.7	SP4	YES	N/A	APTGT100DH120TG	
100		1.7	SP6	-	APTGT100H120G	N/A		
150		1.7	SP6	-	APTGT150H120G	APTGT150DH120G		
200		1.7	SP6	-	APTGT200H120G	APTGT200DH120G		
TRENCH 4	30	1.85	SP1	YES	APTGL30H120T1G	N/A		
	40	1.85	SP1	YES	APTGL40H120T1G	N/A		
	60	1.85	SP3	YES	APTGL60H120T3G	APTGL60DH120T3G		
	90	1.85	SP3	YES	APTGL90H120T3G	APTGL90DH120T3G		
1700	TRENCH 3	30	2.0	SP3	YES	APTGT30H170T3G	N/A	
		50	2.0	SP4	YES	APTGT50H170TG	APTGT50DH170TG	
		100	2.0	SP6	-	APTGT100H170G	APTGT100DH170G	
		150	2.0	SP6	-	APTGT150H170G	APTGT150DH170G	



SP1



SP2



SP3



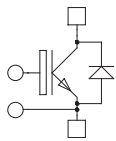
SP4



SP6 Full Bridge

# IGBT Power Modules

## SINGLE SWITCH

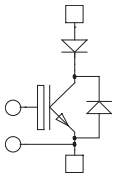


$V_{CES}$ (V)	IGBT Type	$I_C$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ at rated $I_C$	Package Style	NTC	Part Number
600	NPT	360	2.0	D4	-	APTF360U60D4G
		500	2.0	D4	-	APTF500U60D4G
		660	2.0	D4	-	APTF660U60D4G
	TRENCH 3	580	1.5	D4	-	APTGT580U60D4G
		750	1.5	D4	-	APTGT750U60D4G
1200	NPT FAST	400	3.2	D4	-	APTF400U120D4G
		530	3.2	D4	-	APTF530U120D4G
	TRENCH 3	400	1.7	D4	-	APTGT400U120D4G
		600	1.7	D4	-	APTGT600U120D4G
		475	1.85	D4	-	APTGL475U120D4G
	TRENCH 4	700	1.85	D4	-	APTGL700U120D4G
		400	2.0	D4	-	APTGT400U170D4G
1700	TRENCH 3	600	2.0	D4	-	APTGT600U170D4G



D4

## SINGLE SWITCH + SERIES DIODE

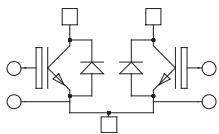


$V_{CES}$ (V)	IGBT Type	$I_C$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ at rated $I_C$	Package Style	NTC	Part Number
1200	NPT FAST	200	3.2	SP6	-	APTF200U120DG
		300	3.2	SP6	-	APTF300U120DG
	TRENCH 4	475	1.85	SP6	-	APTGL475U120DAG



SP4

## DUAL COMMON SOURCE

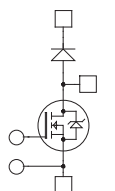
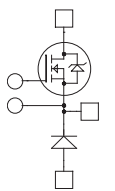


$V_{CES}$ (V)	IGBT Type	$I_C$ (A) $T_c=80^\circ\text{C}$	$V_{CE(ON)}$ at rated $I_C$	Package Style	NTC	Part Number
600	NPT FAST	90	2.1	SP4	YES	APTF90DU60TG
		180	2.1	SP4	YES	APTF180DU60TG
		350	2.1	SP6	-	APTF350DU60G
	TRENCH 3	100	1.5	SP4	YES	APTGT100DU60TG
		150	1.5	SP4	YES	APTGT150DU60TG
		200	1.5	SP4	YES	APTGT200DU60TG
		300	1.4	SP6	-	APTGT300DU60G
		450	1.4	SP6	-	APTGT450DU60G
		600	1.4	SP6	-	APTGT600DU60G
		50	3.2	SP4	YES	APTF50DU120TG
	1200	NPT FAST	100	3.2	SP4	YES
150			3.2	SP4	YES	APTF150DU120TG
300			3.2	SP6	-	APTF300DU120G
50			1.7	SP4	YES	APTGT50DU120TG
TRENCH 3		75	1.7	SP4	YES	APTGT75DU120TG
		100	1.7	SP4	YES	APTGT100DU120TG
		150	1.7	SP6	-	APTGT150DU120G
		150	1.7	SP4	YES	APTGT150DU120TG
		200	1.7	SP6	-	APTGT200DU120G
		300	1.7	SP6	-	APTGT300DU120G
		400	1.7	SP6	-	APTGT400DU120G
1700	TRENCH 3	50	2.0	SP4	YES	APTGT50DU170TG
		100	2.0	SP4	YES	APTGT100DU170TG
		150	2.0	SP6	-	APTGT150DU170G
		225	2.0	SP6	-	APTGT225DU170G
		300	2.0	SP6	-	APTGT300DU170G



SP6

## CHOPPER

$V_{DS}$ (V)	MOSFET type	$R_{DS(on)}$ (mΩ)	$I_D$ (A) $T_c=80^\circ\text{C}$	Package	NTC	 DA...or...U2	 SK...or...U3
100	MOS 5	11	100	SOT227	-	APT10M11JVRU2	APT10M11JVRU3
		4.5	207	SP4	YES	APT10DAM05TG	APT10SKM05TG
		2.25	370	SP6	-	APT10DAM02G	APT10SKM02G
200	MOS 5	22	71	SOT227	-	APT20M22JVRU2	APT20M22JVRU3
	MOS 7	10	125	SP4	YES	APT20DAM10TG	APT20SKM10TG
		8	147	SP4	YES	APT20DAM08TG	APT20SKM08TG
		5	250	SP6	option	APT20DAM05G	APT20SKM05G
		4	300	SP6	option	APT20DAM04G	APT20SKM04G
500	MOS 5	100	30	SOT227	-	APT5010JVRU2	APT5010JVRU3
	MOS 7	100	30	SOT227	-	APT5010JLLU2	APT5010JLLU3
		75	32	SOT227	-	APT50M75JLLU2	APT50M75JLLU3
		38	64	SP4	YES	APT50DAM38TG	APT50SKM38TG
		35	70	SP4	YES	APT50DAM35TG	APT50SKM35TG
		19	125	SP6	option	APT50DAM19G	APT50SKM19G
		17	140	SP6	option	APT50DAM17G	APT50SKM17G
	MOS 8	65	43	SOT227	-	APT58M50JU2	APT58M50JU3
600	COOLMOS	45	38	SOT227	-	APT50N60JCU2	APT50N60JCU3
		70	40	SOT227	-	APT40N60JCU2	APT40N60JCU3
		35	54	SP1	YES	APTC60DAM35T1G	APTC60SKM35T1G
		24	70	SP1	YES	APTC60DAM24T1G	APTC60SKM24T1G
800	COOLMOS	150	21	SP1	YES	APTC80DA15T1G	APTC80SK15T1G
900	COOLMOS	120	25	SOT227	-	APT33N90JCU2	APT33N90JCU3
		60	44	SP1	YES	APTC90DAM60T1G	APTC90SKM60T1G
		MOS 7	180	33	SP4	YES	APT100DA18TG
90	59		SP6	option	APT100DAM90G	APT100SKM90G	
MOS 8	400		15	SP1	YES	APT100DA40T1G	APT100SK40T1G
	330		17	SP1	YES	APT100DA33T1G	APT100SK33T1G
	180		30	SP1	YES	APT100DA18T1G	N/A
	90		59	SP6	option	APT100DAM90G	N/A
1200	MOS 7	290	25	SP4	YES	APT120DA29TG	APT120SK29TG
		150	45	SP6	option	APT120DA15G	APT120SK15G
	MOS 8	680	11	SP1	YES	APT120DA68T1G	APT120SK68T1G
		560	13	SP1	YES	APT120DA56T1G	APT120SK56T1G
		300	23	SP1	YES	APT120DA30T1G	N/A



SOT-227



SP1



SP3

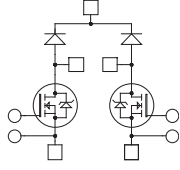
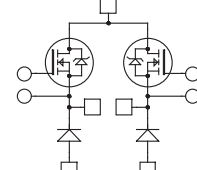


SP4



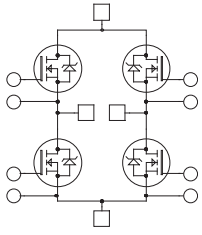
SP6

## DUAL CHOPPER

$V_{DS}$ (V)	MOSFET type	$R_{DS(on)}$ (mΩ)	$I_D$ (A) $T_c=80^\circ\text{C}$	Package	NTC	 ...DDA...	 ...DSK...
100	MOS 5	19	50	SP3	YES	APT10DDAM19T3G	APT10DSKM19T3G
		9	100	SP3	YES	APT10DDAM09T3G	APT10DSKM09T3G
500	MOS 7	100	24	SP3	YES	APT50DDA10T3G	APT50DSK10T3G
		65	37	SP3	YES	APT50DDAM65T3G	APT50DSKM65T3G
600	COOLMOS	45	38	SP1	YES	APTC60DDAM45T1G	APTC60DSKM45T1G
		70	29	SP1	YES	APTC60DDAM70T1G	APTC60DSKM70T1G
		70	29	SP3	YES	APTC60DDAM70T3G	APTC60DSKM70T3G
		35	54	SP3	YES	APTC60DDAM35T3G	APTC60DSKM35T3G
		24	70	SP3	YES	APTC60DDAM24T3G	APTC60DSKM24T3G
800	COOLMOS	290	11	SP3	YES	APTC80DDA29T3G	APTC80DSK29T3G
		150	21	SP3	YES	APTC80DDA15T3G	APTC80DSK15T3G
900	COOLMOS	120	23	SP1	YES	APTC90DDA12T1G	APTC90DSK12T1G
1000	MOS 7	350	17	SP3	YES	APT100DDA35T3G	APT100DSK35T3G
1200	MOS 7	570	13	SP3	YES	APT120DDA57T3G	APT120DSK57T3G

# MOSFET Power Modules

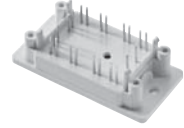
## FULL BRIDGE



V <sub>DSS</sub> (V)	MOSFET TYPE	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package Style	NTC	Part Number
100	FREDFET 5	4.5	207	SP6	-	APTM10HM05FG
		19	50	SP3	YES	APTM10HM19FT3G
		9	100	SP3	YES	APTM10HM09FT3G
		9	100	SP4	YES	APTM10HM09FTG
200	FREDFET 7	20	62	SP4	YES	APTM20HM20FTG
		16	74	SP4	YES	APTM20HM16FTG
		10	125	SP6	-	APTM20HM10FG
		8	147	SP6	-	APTM20HM08FG
500	FREDFET 7	140	18	SP3	YES	APTM50H14FT3G
		100	24	SP3	YES	APTM50H10FT3G
		75	32	SP4	YES	APTM50HM75FTG
		75	32	SP3	YES	APTM50HM75FT3G
		65	37	SP4	YES	APTM50HM65FTG
		65	37	SP3	YES	APTM50HM65FT3G
		38	64	SP6	-	APTM50HM38FG
		35	70	SP6	-	APTM50HM35FG
	FREDFET 8	150	19	SP1	YES	APTM50H15FT1G
	600	COOLMOS	70	29	SP1	YES
45			38	SP1	YES	APTC60HM45T1G
83			21	SP2	YES	APTC60HM83FT2G
70			29	SP3	YES	APTC60HM70T3G
35			54	SP3	YES	APTC60HM35T3G
24		70	SP3	YES	APTC60HM24T3G	
FREDFET 8	230	15	SP1	YES	APTM60H23FT1G	
800	COOLMOS	290	11	SP1	YES	APTC80H29T1G
		150	21	SP1	YES	APTC80H15T1G
		290	11	SP3	YES	APTC80H29T3G
		150	21	SP3	YES	APTC80H15T3G
900	COOLMOS	120	23	SP1	YES	APTC90H12T1G
		120	23	SP2	YES	APTC90H12T2G
		60	44	SP3	YES	APTC90HM60T3G
1000	FREDFET 7	450	14	SP3	YES	APTM100H45FT3G
		350	17	SP4	YES	APTM100H35FTG
		350	17	SP3	YES	APTM100H35FT3G
		180	33	SP6	-	APTM100H18FG
	FREDFET 8	800	8	SP1	YES	APTM100H80FT1G
		460	14	SP3	YES	APTM100H46FT3G
		400	16	SP3	YES	APTM100H40FT3G
		570	13	SP4	YES	APTM120H57FTG
1200	FREDFET 7	570	13	SP3	YES	APTM120H57FT3G
		290	25	SP6	-	APTM120H29FG
		1400	6	SP1	YES	APTM120H140FT1G
	FREDFET 8	800	10	SP3	YES	APTM120H80FT3G
		650	12	SP3	YES	APTM120H65FT3G



SP1



SP2



SP3

NEW!



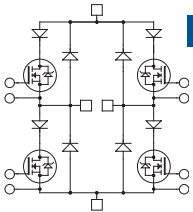
SP4

NEW!



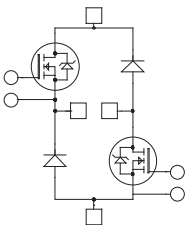
SP6

## FULL BRIDGE + SERIES AND PARALLEL DIODES



V <sub>DSS</sub> (V)	MOSFET TYPE	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package Style	NTC	Part Number
200	MOS 7	20	62	SP4	YES	APTM20HM20STG
500	MOS 7	75	32	SP4	YES	APTM50HM75STG
1000	MOS 7	450	13	SP4	YES	APTM100H45STG

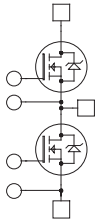
## ASYMMETRICAL BRIDGE



V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package Style	NTC	Part Number
100	MOS5	9	100	SP3	YES	APTM10DHM09T3G
		9	100	SP4	YES	APTM10DHM09TG
		4.5	207	SP6	-	APTM10DHM05G
200	MOS 7	20	62	SP3	YES	APTM20DHM20T3G
		16	74	SP3	YES	APTM20DHM16T3G
		10	125	SP6	-	APTM20DHM10G
		8	147	SP6	-	APTM20DHM08G
500	MOS 7	75	32	SP4	YES	APTM50DHM75TG
		65	37	SP4	YES	APTM50DHM65TG
		38	64	SP6	-	APTM50DHM38G
		35	70	SP6	-	APTM50DHM35G
		MOS 8	65	72	SP3	-
600	COOLMOS	45	38	SP1	YES	APTC60DHM45T1G
		35	54	SP3	YES	APTC60DHM35T3G
		24	70	SP3	-	APTC60DHM24T3G



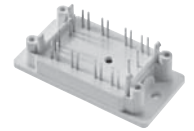
## PHASE LEG



V <sub>DSS</sub> (V)	MOSFET TYPE	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package Style	NTC	Part Number
100	FREDFET 5	4.5	207	SP4	YES	APTM10AM05FTG
		2.25	370	SP6	option	APTM10AM02FG
200	FREDFET 7	10	125	SP4	YES	APTM20AM10FTG
		8	147	SP4	YES	APTM20AM08FTG
		5	250	SP6	option	APTM20AM05FG
		4	300	SP6	option	APTM20AM04FG
		4	300	SP6	option	APTM20AM04FG
500	FREDFET 7	38	64	SP4	YES	APTM50AM38FTG
		35	70	SP4	YES	APTM50AM35FTG
		19	125	SP6	option	APTM50AM19FG
	FREDFET 8	17	140	SP6	option	APTM50AM17FG
		150	19	SP1	YES	APTM50A15FT1G
		70	37	SP1	YES	APTM50AM70FT1G
600	COOLMOS	70	29	SP1	YES	APTC60AM70T1G
		45	38	SP1	YES	APTC60AM45T1G
		42	40	SP2	-	APTC60AM42F2G
		35	54	SP1	YES	APTC60AM35T1G
		24	70	SP1	YES	APTC60AM24T1G
	FREDFET 8	24	70	SP2	-	APTC60AM24G
		230	15	SP1	YES	APTM60A23FT1G
800	COOLMOS	110	30	SP1	YES	APTM60A11FT1G
		150	21	SP1	YES	APTC80A15T1G
900	COOLMOS	120	23	SP1	YES	APTC90A12T1G
		60	44	SP1	YES	APTC90AM60T1G
		60	44	SP2	-	APTC90AM60G
1000	FREDFET 7	180	33	SP4	YES	APTM100A18FTG
		90	59	SP6	option	APTM100AM90FG
	FREDFET 8	460	14	SP1	YES	APTM100A46FT1G
		400	16	SP1	YES	APTM100A40FT1G
1200	FREDFET 7	290	25	SP4	YES	APTM120A29FTG
		150	45	SP6	option	APTM120A15FG
	FREDFET 8	800	10	SP1	YES	APTM120A80FT1G
		650	12	SP1	YES	APTM120A65FT1G



SP1



SP2

NEW!



NEW!

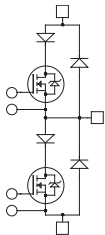
SP4

NEW!



SP6

## PHASE LEG + SERIES AND PARALLEL DIODES

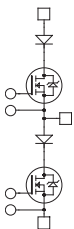


V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package Style	NTC	Part Number
200	MOS 7	10	125	SP4	YES	APTM20AM10STG
		6	225	SP6	-	APTM20AM06SG
500	MOS 7	38	64	SP4	YES	APTM50AM38STG
		24	110	SP6	-	APTM50AM24SG
1000	MOS 7	230	26	SP4	YES	APTM100A23STG
		130	49	SP6	-	APTM100A13SG
1200	MOS 7	200	37	SP6	-	APTM120A20SG



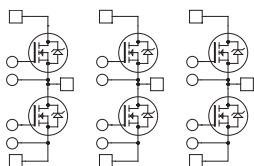
SP6-P

## PHASE LEG + SERIES DIODES



V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package Style	NTC	Part Number
1000	MOS 7	130	49	SP6	-	APTM100A13DG
1200	MOS 7	200	37	SP6	-	APTM120A20DG

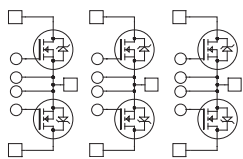
## TRIPLE PHASE LEG



V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package Style	NTC	Part Number
75	MOSFET	4.2	90	SP6-P	option	APTM08TAM04PG
		19	50	SP6-P	option	APTM10TAM19FPG
100	FREDFET 5	9	100	SP6-P	option	APTM10TAM09FPG
		9	100	SP6-P	option	APTM10TAM09FPG
200	FREDFET 7	16	74	SP6-P	option	APTM20TAM16FPG
500	FREDFET 7	65	37	SP6-P	option	APTM50TAM65FPG
		65	37	SP6-P	option	APTM50TAM65FPG
600	COOLMOS	35	54	SP6-P	option	APTC60TAM35PG
		24	70	SP6-P	YES	APTC60TAM24TPG
800	COOLMOS	150	21	SP6-P	option	APTC80TA15PG
900	COOLMOS	60	44	SP6-P	YES	APTC90TAM60TPG
1000	FREDFET 7	350	17	SP6-P	option	APTM100TA35FPG
1200	FREDFET 7	570	13	SP6-P	option	APTM120TA57FPG

# MOSFET Power Modules

## TRIPLE DUAL COMMON SOURCE



V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package	NTC	Part Number
75	MOSFET	4.2	90	SP6-P	option	APTM08TDUM04PG
100	MOS 5	19	50	SP6-P	option	APTM10TDUM19PG
		9	100	SP6-P	option	APTM10TDUM09PG
200	MOS 7	16	74	SP6-P	option	APTM20TDUM16PG
500	MOS 7	65	37	SP6-P	option	APTM50TDUM65PG
600	COOLMOS	35	54	SP6-P	option	APTC60TDUM35PG
		24	70	SP6-P	YES	APTC60TDUM24TPG
800	COOLMOS	150	21	SP6-P	option	APTC80TDU15PG
900	COOLMOS	60	44	SP6-P	YES	APTC90TDUM60TPG
1000	MOS 7	350	17	SP6-P	option	APTM120TDU35PG
1200	MOS 7	570	13	SP6-P	option	APTM120TDU57PG

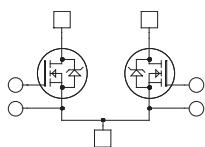


SP1



SP3

## DUAL COMMON SOURCE



V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package	NTC	Part Number
100	MOS 5	4.5	207	SP4	YES	APTM10DUM05TG
		2.25	370	SP6	-	APTM10DUM02G
		10	125	SP4	YES	APTM20DUM10TG
200	MOS 7	8	147	SP4	YES	APTM20DUM08TG
		5	250	SP6	-	APTM20DUM05G
		4	300	SP6	-	APTM20DUM04G
		38	64	SP4	YES	APTM50DUM38TG
500	MOS 7	35	70	SP4	YES	APTM50DUM35TG
		19	125	SP6	-	APTM50DUM19G
		17	140	SP6	-	APTM50DUM17G
1000	MOS 7	180	33	SP4	YES	APTM100DU18TG
		90	59	SP6	-	APTM100DUM90G
1200	MOS 7	290	25	SP4	YES	APTM120DU29TG
		150	45	SP6	-	APTM120DU15G

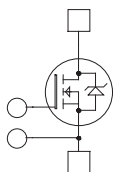


SP4



SP6

## SINGLE SWITCH

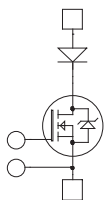


V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package	NTC	Part Number
100	FREDFET 5	2.25	430	SP6	option	APTM10UM02FAG
		1.50	640	SP6	option	APTM10UM01FAG
200	FREDFET 7	3	434	SP6	option	APTM20UM03FAG
500	FREDFET 7	9	371	SP6	option	APTM50UM09FAG
1000	FREDFET 7	60	97	SP6	option	APTM100UM60FAG
		45	160	SP6	option	APTM100UM45FAG
1200	FREDFET 7	70	126	SP6	option	APTM120UM70FAG



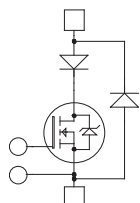
SP6-P

## SINGLE SWITCH + SERIES DIODE



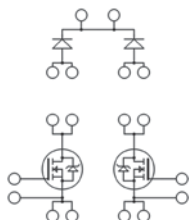
V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package	NTC	Part Number
1000	MOS 7	65	110	SP6	-	APTM100UM65DAG
		45	160	SP6	-	APTM100UM45DAG
1200	MOS 7	100	86	SP6	-	APTM120U10DAG
		70	126	SP6	-	APTM120UM70DAG

## SINGLE SWITCH + SERIES AND PARALLEL DIODES




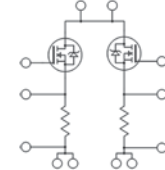
V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package	NTC	Part Number
200	MOS 7	4	310	SP6	-	APTM20UM04SAG
500	MOS 7	13	250	SP6	-	APTM50UM13SAG
1000	MOS 7	65	100	SP6	-	APTM100UM65SAG
1200	MOS 7	100	86	SP6	-	APTM120U10SAG

## INTERLEAVED PFC



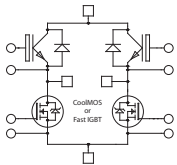
V <sub>DSS</sub> (V)	MOSFET type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>c</sub> =80° C	Package	NTC	Part Number
600	COOLMOS	45	38	SP1	YES	APTC60VDAM45T1G
		24	70	SP3	YES	APTC60VDAM24T3G
900		120	23	SP1	YES	APTC90VDA12T1G
1000	MOSFET	350	17	SP3	YES	APTM100VDA35T3G
1200		570	13	SP3	YES	APTM120VDA57T3G

## SINGLE & DUAL LINEAR MOSFET

$V_{DS}$ (V)	MOSFET Type	$R_{DS(on)}$ (m $\Omega$ )	Shunt Resistor (mR)	Package Style	NTC		
100	MOSFET	9	4.4	SP1 or SP3	YES	APTML10UM09R004T1AG	APTML102UM09R004T3AG
200		18	10		YES	APTML20UM18R010T1AG	APTML202UM18R010T3AG
500		90	20		YES	APTML50UM90R020T1AG	APTML502UM90R020T3AG
600		125	20		YES	APTML60U12R020T1AG	APTML602U12R020T3AG
1000		600	20		YES	APTML100U60R020T1AG	APTML1002U60R020T3AG

## Renewable Energy Power Modules

### FULL BRIDGE



$V_{CES}$ (V)	Technology	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_c$	Package	NTC	Part Number
600	Mix Trench IGBT & NPT IGBT	30	2.1/1.5	SP3	YES	APTVG30H60T3G
		50	2.1/1.5	SP3	YES	APTVG50H60T3G
		75	2.1/1.5	SP3	YES	APTVG75H60T3G
		100	2.1/1.5	SP3	YES	APTVG100H60T3G
	Mix Trench IGBT & CoolMOS	50	83mR/1.5	SP1	YES	APTCV40H60CT1G
1200	Mix Trench IGBT & NPT IGBT	50	45mR/1.5	SP3	YES	APTCV50H60T3G
		15	3.2/1.7	SP3	YES	APTVG15H120T3G
		25	3.2/1.7	SP3	YES	APTVG25H120T3G
		50	3.2/1.7	SP3	YES	APTVG50H120T3G

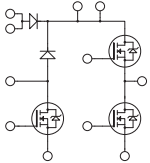


SP1



SP3

### PFC + BYPASS DIODE + PHASE LEG



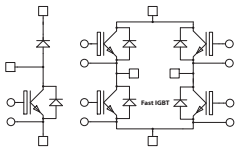
$V_{CES}$ (V)	Technology	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_c$	Package	NTC	Special	Part Number
600	CoolMOS	38	45mR	SP1	N/A	10A PFC SiC diode	APTC60AM45BC1G
		38	45mR	SP1	N/A	-	APTC60AM45B1G
		27	83mR	SP1	N/A	10A PFC SiC diode	APTC60AM83BC1G
		27	83mR	SP1	N/A	-	APTC60AM83B1G

NEW!



SP3F

### PFC + FULL BRIDGE



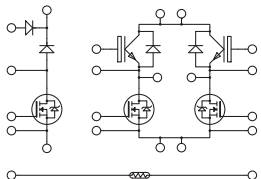
$V_{CES}$ (V)	Technology	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_c$	Package	NTC	Part Number
600	Mix Trench IGBT & NPT IGBT	50	2.1/1.5	SP4	-	APTVG50H60BG
		100	2.1/1.5	SP6-P	YES	APTVG100H60BTPG
1200	Mix Trench IGBT & NPT IGBT	25	3.2/1.7	SP4	-	APTVG25H120BG
		50	3.2/1.7	SP6-P	YES	APTVG50H120BTPG

NEW!



SP4

### PFC + BYPASS DIODE + FULL BRIDGE



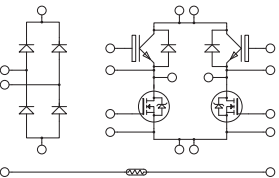
$V_{CES}$ (V)	Technology	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_c$	Package	NTC	Special	Part Number
600	Mix Trench IGBT & CoolMOS	38	1.5/45mR	SP3F	YES	20A PFC SiC diode	APTCV60HM45BC20T3G
		38	1.5/45mR	SP3F	YES	-	APTCV60HM45BT3G
		29	1.5/70mR	SP3F	YES	-	APTCV60HM70BT3G
	CoolMOS	29	70mR	SP3F	YES	-	APTCV60HM70BT3G
	Mix Trench IGBT & NPT	50	3.2/1.7	SP3F	YES	-	APTVG50H60BT3G

NEW!



SP6-P

### SECONDARY FAST RECTIFIER + FULL BRIDGE

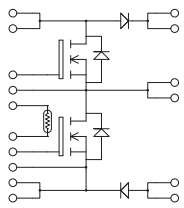


$V_{CES}$ (V)	Technology	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_c$	Package	NTC	Special	Part Number
600	Mix Trench IGBT & CoolMOS	38	1.5/45mR	SP3F	YES	20A SiC antiparallel diode	APTCV60HM45RCT3G
		38	1.5/45mR	SP3F	YES	-	APTCV60HM45RT3G
		29	1.5/70mR	SP3F	YES	-	APTCV60HM70RT3G
	CoolMOS	29	70mR	SP3F	YES	-	APTCV60HM70RT3G
	Trench 3	50	1.5	SP3F	YES	-	APTVG50H60RT3G

NEW!

# Renewable Energy Power Modules

## BOOST BUCK



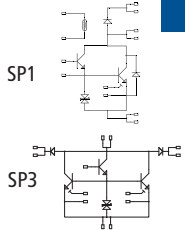
$V_{CES}$ (V)	Technology	$I_C$ (A) $T_C=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_C$	Package	NTC	Part Number
650	MD MESH 5	78	19mR	SP3F	YES	APT5M65BBM19T3G
600	COOLMOS	70	24mR	SP3F	YES	APTC60BBM24T3G
	TRENCH 3	100	1.5	SP3F	YES	APTGT100BB60T3G

NEW!



SP1

## BOOST AND BUCK



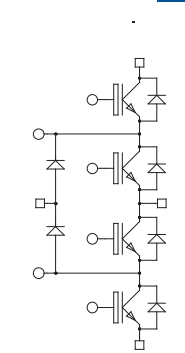
$V_{CES}$ (V)	Technology	$I_C$ (A) $T_C=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_C$	Package	NTC	Special	Part Number
1200	ESBT + SiC Boost Diode	45	6KW to 8KW	SP1	YES	Boost Chopper	APTES45DA120CT1G
		45	6KW to 8KW	SP1	YES	Buck Chopper	APTES45SK120CT1G
		80	15KW	SP3	N/A	Boost Chopper	APTES80DA120C3G

NEW!



SP3

## THREE LEVEL INVERTER



$V_{CES}$ (V)	Technology	$I_C$ (A) $T_C=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_C$	Package	NTC	Part Number	
600	TRENCH 3	20	1.5	SP3	YES	APTGT20TL60T3G	
		20	1.5	SP1	-	APTGT20TL601G	
		30	1.5	SP3	YES	APTGT30TL60T3G	
		30	1.5	SP1	-	APTGT30TL601G	
		50	1.5	SP3	YES	APTGT50TL60T3G	
		50	1.5	SP1	-	APTGT50TL601G	
		75	1.5	SP3	YES	APTGT75TL60T3G	
		100	1.5	SP3	YES	APTGT100TL60T3G	
		150	1.5	SP6	-	APTGT150TL60G	
		200	1.5	SP6	-	APTGT200TL60G	
		300	1.5	SP6	-	APTGT300TL60G	
		NPT FAST	30	2.1	SP3	YES	APTGF30TL60T3G
			30	2.1	SP1	-	APTGF30TL601G
			50	2.1	SP3	YES	APTGF50TL60T3G
1200	TRENCH 4	60	1.85	SP3	YES	APTGL60TL120T3G	
1700	TRENCH 3	240	1.8	SP6	-	APTGL240TL120G	
		100	2.0	SP6	-	APTGT100TL170G	

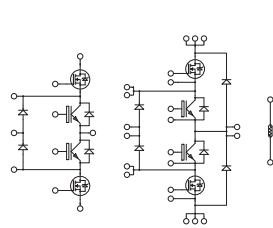
NEW!



SP3F



SP6



$V_{CES}$ (V)	Technology	$R_{DS(on)}$ COOLMOS (m $\Omega$ )	$V_{CE(on)}$ IGBT (V) / $I_C$ (A)	Package	NTC	Part Number
600	Mix Trench IGBT & CoolMOS	24	1.5/75	SP3	YES	APTCV60TLM24T3G
		45	1.5/75	SP3	YES	APTCV60TLM45T3G
		70	1.5/50	SP3	YES	APTCV60TLM70T3G
		99	1.5/30	SP3	YES	APTCV60TLM99T3G
		99	1.5/30	SP1	-	APTCV60TLM991G
900	Mix Trench IGBT & CoolMOS	120	1.85/50	SP3	YES	APTCV90TL12T3G

SP1

SP3

# Power Modules with SiC Schottky Diodes

Silicon Carbide (SiC) Schottky Diodes offers superior dynamic and thermal performance over conventional Silicon power diodes. The main advantages of the SiC Schottky Diodes are:

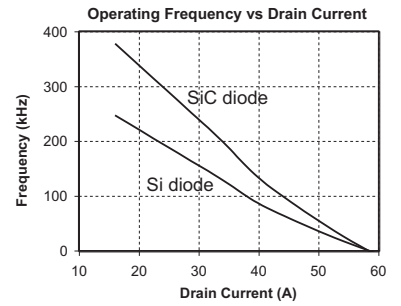
- Essentially zero forward and reverse recovery = reduced switch and diode switching losses
- Temperature independent switching behavior = stable high temperature performance
- Positive temperature coefficient of VF = ease of parallel operation
- Usable 175°C Junction Temperature = safely operate at higher temperatures

Extremely fast switching of SiC Schottky diode enables designs with:

- Improved System Efficiency
- Higher Reliability
- Lower System Switching Losses
- Lower System Cost
  - Smaller EMI Filter
  - Smaller Magnetic Components
  - Smaller Heat-Sink
  - Smaller Switches, Eliminate Snubbers
- Reduced System Size
  - Fewer / Smaller Components

## Applications:

- PFC
- Output Rectification
- Solar Inverter
- Motor Control
- Snubber Diode



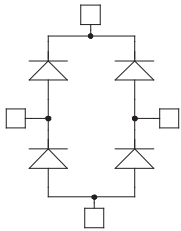
## Diode Power Modules with SiC Diodes

### DUAL DIODE

$V_{RRM}$ (V)	DIODE type	$I_F$ (A) $T_c=100^\circ\text{C}$	$V_F$ (V) $T_j=25^\circ\text{C}$	Package	Anti-Parallel	Parallel
600	SiC	20	1.6	SOT-227	APT2X20DC60J	APT2X21DC60J
		30	1.6	SOT-227	APT2X30DC60J	APT2X31DC60J
		40	1.6	SOT-227	APT2X40DC60J	APT2X41DC60J
		50	1.6	SOT-227	APT2X50DC60J	APT2X51DC60J
		60	1.6	SOT-227	APT2X60DC60J	APT2X61DC60J
		90	1.6	SP1	-	APTDC902U601G
1200	SiC	20	1.6	SOT-227	APT2X20DC120J	APT2X21DC120J
		30	1.6	SOT-227	APT2X30DC120J	APT2X31DC120J
		40	1.6	SOT-227	APT2X40DC120J	APT2X41DC120J
		50	1.6	SOT-227	APT2X50DC120J	APT2X51DC120J
		60	1.6	SOT-227	APT2X60DC120J	APT2X61DC120J
		90	1.6	SP1	-	APTDC902U1201G



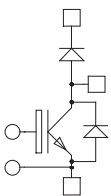
### FULL BRIDGE



$V_{RRM}$ (V)	DIODE Type	$I_F$ (A) $T_c=100^\circ\text{C}$	$V_F$ (V) $T_j=25^\circ\text{C}$	Package	Part Number
600	SiC	6	1.6	SOT-227	APT06DC60HJ
		10	1.6	SP1	APTDC10H601G
		10	1.6	SOT-227	APT10DC60HJ
		20	1.6	SP1	APTDC20H601G
		20	1.6	SOT-227	APT20DC60HJ
		30	1.6	SP1	APTDC30H601G
		30	1.6	SOT-227	APT30DC60HJ
		40	1.6	SP1	APTDC40H601G
		40	1.6	SOT-227	APT40DC60HJ
		1200	SiC	5	1.6
10	1.6			SP1	APTDC10H1201G
10	1.6			SOT-227	APT10DC120HJ
20	1.6			SP1	APTDC20H1201G
20	1.76			SOT-227	APT20DC120HJ
30	1.6			SP1	APTDC30H1201G
30	1.6			SOT-227	APT30DC120HJ
40	1.6			SP1	APTDC40H1201G
40	1.6			SOT-227	APT40DC120HJ

## IGBT Power Modules with SiC Diodes

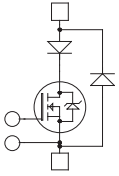
### BOOST CHOPPER



$V_{CES}$ (V)	IGBT	$I_c$ (A) $T_c=80^\circ\text{C}$	$V_{CE(on)}$ (V) at rated $I_c$	Package	NTC	Part Number
600	NPT	30	2.1	SOT-227	-	APT30GF60JCU2
		50	2.1	SOT-227	-	APT50GF60JCU2
		90	2.1	SP1	YES	APTGF90DA60CT1G
1200	NPT	15	3.2	SOT-227	-	APT15GF120JCU2
		25	3.2	SOT-227	-	APT25GF120JCU2
		50	3.2	SP1	YES	APTGF50DA120CT1G

# Power Modules with SiC Schottky Diodes

## MOSFETs & COOLMOS™ Power Modules with SiC Diodes



### SINGLE SWITCH + SERIES FRED AND SIC PARALLEL DIODES

V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package	NTC	Part Number
1000	MOS 7	65	110	SP6	option	APTM100UM655CAVG
1200	MOS 7	100	86	SP6	option	APTM120U105CAVG

### CHOPPER

V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package	NTC	...DA...or...U2	...SK...or...U3
500	MOS 7	38	67	SP4	YES	APTM50DAM38CTG	N/A
	MOS 8	65	43	SOT-227	-	APT58M50JCU2	APT58M50JCU3
600	COOLMOS	45	38	SOT-227	-	APT50N60JCCU2	N/A
		24	70	SP1	YES	APTC60DAM24CT1G	APTC60SKM24CT1G
		18	107	SP4	YES	APTC60DAM18CTG	N/A
900	COOLMOS	120	25	SOT-227	-	APT33N90JCCU2	APT33N90JCCU3
		60	44	SP1	YES	APTC90DAM60CT1G	APTC90SKM60CT1G
1000	MOS 8	330	20	SOT-227	-	APT26M100JCU2	APT26M100JCU3
		400	17	SOT-227	-	APT22M100JCU2	APT22M100JCU3
		180	30	SP1	YES	APTM100DA18CT1G	N/A
1200	MOS 8	560	15	SOT-227	-	APT20M120JCU2	APT20M120JCU3
		680	13	SOT-227	-	APT17M120JCU2	APT17M120JCU3
		300	23	SP1	YES	APTM120DA30CT1G	N/A



### DUAL CHOPPER

V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package	NTC	...DDA...	...DSK...
600	COOLMOS	45	38	SP1	YES	APTC60DDAM45CT1G	APTC60DSKM45CT1G
		70	29	SP1	YES	APTC60DDAM70CT1G	APTC60DSKM70CT1G
900	COOLMOS	120	23	SP1	YES	APTC90DDA12CT1G	APTC90DSK12CT1G



### PHASE LEG + SERIES FRED AND SIC PARALLEL DIODES

V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package	NTC	Part Number
500	MOS 7	38	67	SP4	YES	APTM50AM38SCTG
		24	110	SP6	-	APTM50AM24SCG
600	COOLMOS	35	54	SP4	YES	APTC60AM35SCTG
		24	70	SP4	YES	APTC60AM24SCTG
		18	107	SP6	-	APTC60AM18SCG
800	COOLMOS	150	21	SP4	YES	APTC80A15SCTG
		100	32	SP4	YES	APTC80A10SCTG
		75	43	SP6	-	APTC80AM75SCG
900	COOLMOS	60	44	SP4	YES	APTC90AM60SCTG
1000	MOS 7	230	27	SP4	YES	APTM100A23SCTG
		130	49	SP6	-	APTM100A13SCG

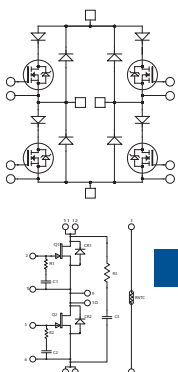
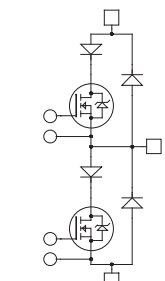


### FULL BRIDGE + SERIES FRED AND SIC PARALLEL DIODES

V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package	NTC	Part Number
500	MOS 7	75	34	SP4	YES	APTM50HM75SCTG
600	COOLMOS	70	29	SP4	YES	APTC60HM70SCTG
		45	38	SP4	YES	APTC60HM45SCTG
800	COOLMOS	290	11	SP4	YES	APTC80H29SCTG
900	COOLMOS	120	23	SP4	YES	APTC90H12SCTG
1000	MOS 7	450	14	SP4	YES	APTM100H45SCTG

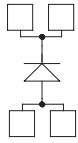
### FULL SiC POWER MODULES — PHASE LEG JFET SIC + SIC PARALLEL DIODES

V <sub>DSS</sub> (V)	MOSFET Type	R <sub>DS(ON)</sub> (mΩ)	I <sub>D</sub> (A) T <sub>C</sub> =80°C	Package	Function	Part Number
1200	JFET N/OFF	13	113	SP1	NTC + RC Network	APTJC120AM13VCT1AG <b>NEW!</b>



# DIODE Power Modules

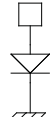
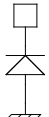
## SINGLE DIODE



$V_{RRM}$ (V)	FRED Type	IF(A) $T_c=80^\circ\text{C}$	VF(V) $T_j=25^\circ\text{C}$	Package Style	Part Number
200	FRED	500	1.1	LP4	APTDF500U20G
400	FRED	500	1.5	LP4	APTDF500U40G
600	FRED	450	1.8	LP4	APTDF450U60G
1000	FRED	430	2.3	LP4	APTDF430U100G
1200	FRED	400	2.5	LP4	APTDF400U120G

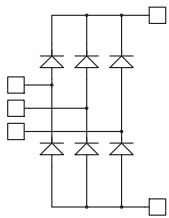


## SINGLE DIODE, NON ISOLATED PACKAGE

$V_{RRM}$ (V)	FRED Type	IF(A) per Diode	VF(V) $T_j=25^\circ\text{C}$	Package Style				
					Cathode to Base	Anode to Base		
35-40-45	Schottky	120	0.55	Half-Pack	HS12035-45	HS12035R-45R		
80-90-100			0.91		HS12380-100	HS12380R-100R		
30			0.55		HS18230	HS18230R		
35-40-45			0.70		HS18135-45	HS18135R-45R		
80-90-100		0.91	HS18380-100		HS18380R-100R			
30		0.55	HS24230		HS24230R			
35-40-45		240	240		0.55	HS24035-45	HS24035R-45R	
80-90-100					0.86	HS24380-100	HS24380R-100R	
150					0.86	HS246150	HS246150R	
180-200					0.86	HS247180-200	HS247180R-200R	
600-700-800		FRED	100		1.35	Half-Pack	HU10260-80	HU10260R-80R
600-700-800			200		1.35		HU20260-80	HU20260R-80R
200-400-600-800	RECTIFIER	300	1.1	SDM	SDM30002-08	SDM30002R-08R		



## 3-PHASE BRIDGE



$V_{RRM}$ (V)	Diode Type	IF(A) $T_c=80^\circ\text{C}$	VF(V) $T_j=25^\circ\text{C}$	Package Style	Part Number
1600	RECTIFIER	40	1.3	SP1	APTDR40X1601G
		90	1.3	SP1	APTDR90X1601G
800 1200 1600 1800	RECTIFIER	30	1.6	SM1	MSD30-08/12/16/18
		50	1.5	SM1	MSD50-08/12/16/18
		50	1.45	SM2-1	MSDM50-08/12/16/18
		52	1.8	SM2	MSD52-08/12/16/18
		75	1.6	SM2	MSD75-08/12/16/18
		75	1.38	SM2-1	MSDM75-08/12/16/18
		100	1.9	SM3	MSD100-08/12/16/18
		100	1.7	SM2-1	MSDM100-08/12/16/18
		130	1.8	SM3	MSD130-08/12/16/18
		150	1.28	SM3-1	MSDM150-08/12/16/18
		160	1.65	SM3	MSD160-08/12/16/18
		200	1.55	SM3	MSD200-08/12/16/18
200	1.31	SM3-1	MSDM200-08/12/16/18		

NEW!

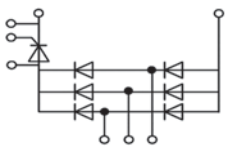
NEW!

NEW!

NEW!

NEW!

## 3-PHASE BRIDGE + THYRISTOR

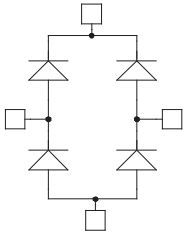


$V_{RRM}$ (V)	Diode Type	IF(A) $T_c=80^\circ\text{C}$	VF(V) $T_j=25^\circ\text{C}$	Package Style	Part Number
800	RECTIFIER THYRISTOR	75	1.4	SM4	MSDT75-08/12/16
1200		100	1.35	SM4	MSDT100-08/12/16
1600		150	1.35	SM4	MSDT150-08/12/16
		200	1.35	SM5	MSDT200-08/12/16

NEW!



## FULL BRIDGE



$V_{RRM}$ (V)	Diode Type	IF(A) per diode	VF(V) $T_j=25^\circ C$	Package Style	Part Number	
200	FRED	30	1.0	SOT-227	APT30DF20HJ	
		60	1.0	SOT-227	APT60DF20HJ	
		100	1.0	SP4	APTDF100H20G	
		200	1.0	SP6	APTDF200H20G	
600		30	1.6	SOT-227	APT30DL60HJ	
		30	1.8	SP1	APTDF30H601G	
		30	1.8	SOT-227	APT30DF60HJ	
		50	1.6	SOT-227	APT50DL60HJ	
		60	1.8	SOT-227	APT60DF60HJ	
		60	1.8	SP1	APTDF60H601G	
		75	1.6	SOT-227	APT75DL60HJ	
		100	1.6	SOT-227	APT100DL60HJ	
		100	1.6	SP1	APTDF100H601G	
		200	1.6	SP6	APTDF200H60G	
		1000	30	2.1	SOT-227	APT30DF100HJ
			60	2.1	SOT-227	APT60DF100HJ
100	2.1		SP4	APTDF100H100G		
200	2.1		SP6	APTDF200H100G		
1200	30	2.6	SP1	APTDF30H1201G		
	30	2.6	SOT-227	APT30DF120HJ		
	35	1.6	SOT-227	APT35DL120HJ		
	50	1.6	SOT-227	APT50DL120HJ		
	60	2.6	SP1	APTDF60H1201G		
	60	2.6	SOT-227	APT60DF120HJ		
	75	1.6	SOT-227	APT75DL120HJ		
	100	2.5	SP1	APTDF100H1201G		
1700	200	2.4	SP6	APTDF200H120G		
	50	1.8	SOT-227	APT50DF170HJ		
	75	1.8	SOT-227	APT75DF170HJ		
	100	2.2	SP4	APTDF100H170G		
45	SCHOTTKY	40	0.9	SOT-227	APT40DS04HJ	
		60			APT60DS04HJ	
40		APT40DS10HJ				
60		APT60DS10HJ				
200		30			APT30DS20HJ	
60		APT60DS20HJ				
RECTIFIER	10	1.3	VJ	VJ248M		
				VJ448M		
				VJ648M		
				VJ848M		
				VJ1048M		
				1600	40	SOT-227
90	SOT-227	APT90DR160HJ				
250-700	CONTROLLED AVALANCHE RECTIFIERS	10	1.3	VJ	VJ247M	
450-900					VJ447M	
660-1100					VJ647M	
850-1300					VJ847M	



## THYRISTOR & DIODE DOUBLER

$V_{RRM}$ (V)	Diode Type	IF(A) per diode	VF/VTM (V) $T_j=25^\circ C$	Package Style	Thyristor Diode Doubler	Thyristor Doubler
800 1200 1600	Rectifier Thyristor	25	1.8	SF1	MSFC25-08/12/16	MSTC25-08/12/16
		40	1.95		MSFC40-08/12/16	MSTC40-08/12/16
		60	1.65		MSFC60-08/12/16	MSTC60-08/12/16
		90	1.65		MSFC90-08/12/16	MSTC90-08/12/16
		110	1.65	D1	MSFC110-08/12/16	MSTC110-08/12/16
		130	1.8		MSFC130-08/12/16	MSTC130-08/12/16
		160	1.7		MSFC160-08/12/16	MSTC160-08/12/16

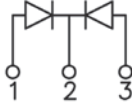
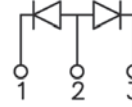
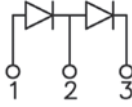


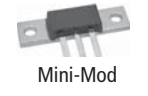
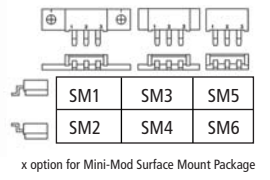
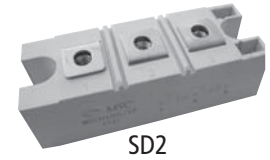
NEW!



# DIODE Power Modules

## COMMON CATHODE • COMMON ANODE • DOUBLER

VRRM (V)	Diode Type	IF (A) per Diode	VF(V) $T_j=25^\circ\text{C}$	Package						
					Common Cathode	Common Anode	Doubler			
200	FRED	400	1.0	SP6	APTDF400KK20G	APTDF400AA20G	APTDF400AK20G			
600			1.6		APTDF400KK60G	APTDF400AA60G	APTDF400AK60G			
1000			2.1		APTDF400KK100G	APTDF400AA100G	APTDF400AK100G			
1200			2.4		APTDF400KK120G	APTDF400AA120G	APTDF400AK120G			
1700			2.2		APTDF400KK170G	APTDF400AA170G	APTDF400AK170G			
800-1200-1600-1800	RECTIFIER	36	1.15	SD1	MSKD36-08/12/16/18	MSAD36-08/12/16/18	MSCD36-08/12/16/18			
		60	1.15		MSKD60-08/12/16/18	MSAD60-08/12/16/18	MSCD60-08/12/16/18			
		70	1.15		MSKD70-08/12/16/18	MSAD70-08/12/16/18	MSCD70-08/12/16/18			
		100	1.15		MSKD100-08/12/16/18	MSAD100-08/12/16/18	MSCD100-08/12/16/18			
		120	1.15		MSKD120-08/12/16/18	MSAD120-08/12/16/18	MSCD120-08/12/16/18			
		165	1.15	SD2	MSKD165-08/12/16/18	MSAD165-08/12/16/18	MSCD165-08/12/16/18			
		200	1.15		MSKD200-08/12/16/18	MSAD200-08/12/16/18	MSCD200-08/12/16/18			
150	SCHOTTKY	40	0.86	Mini-Mod Surface Mount <small>see x option details before ordering</small>	FST80150SMxC	FST80150SMxA	FST80150SMxD			
500-600-700-800	FRED	35	1.35		UFT7250SMxC-80SMxC	UFT7250SMxA-80SMxA	UFT7250SMxD-80SMxD			
80-90-100	SCHOTTKY		0.82	Mini-Mod	FST8080-100	FST8080A-100A	FST8080D-100D			
30-35-40-45			0.53		FST8130-45	FST8130A-45A	FST8130D-45D			
100-150-200	FRED	35	0.95		UFT7010-20	UFT7010A-20A	UFT7010D-20D			
200-300-400-500			1.20	UFT7120-50	UFT7120A-50A	UFT7120D-50D				
30-35-40-45	SCHOTTKY	50	0.53	TO-249 Flat Pak	FST10030-45	FST10030A-45A	FST10030D-45D			
35-40-45-50			0.74		FST16035-50	FST16035A-50A	FST16035D-50D			
90-100			0.96		FST16090-100	FST16090A-100A	FST16090D-100D			
35-40-45	0.65	FST16135-45	FST16135A-45A		FST16135D-45D					
30	0.47	FST16230	FST16230A		FST16230D					
100-150-200	FRED	70	0.98		UFT14010-20	UFT14010A-20A	UFT14010D-20D			
300-400-500			1.25		UFT14130-50	UFT14130A-50A	UFT14130D-50D			
500-600-700-800			1.35		UFT14250-80	UFT14250A-80A	UFT14250D-80D			
300-400-500			1.25		UFT21130-50	UFT21130A-50A	UFT21130D-50D			
80-90-100	SCHOTTKY	60	0.86		9 Pins TO-249	FST6080-100	FST6080A-100A	FST6080D-100D		
80-90-100			0.94	FST15380-100		FST15380A-100A	FST15380D-100D			
35-40-45-50		100	0.8	TwinTower Non Isolated		CPT12035-50	CPT12035A-50A	CPT12035D-50D		
30-35-40-45			0.68			CPT20130-45	CPT20130A-45A	CPT20130D-45D		
35-40-45			0.76			CPT30035-50	CPT30035A-50A	CPT30035D-50D		
60			0.82			CPT30060	CPT30060A	CPT30060D		
80-90-100			150			0.98	CPT30080-100	CPT30080A-100A	CPT30080D-100D	
35-40-45						0.62	CPT30135-45	CPT30135A-45A	CPT30135D-45D	
80-90-100						200	0.89	CPT40080-100	CPT40080A-100A	CPT40080D-100D
30-35-40-45							0.57	CPT40130-45	CPT40130A-45A	CPT40130D-45D
60		250	0.73		CPT50060	CPT50060A	CPT50060D			
80-90-100			0.90		CPT50080-100	CPT50080A-100A	CPT50080D-100D			
30-35-40-45			0.55		CPT50130-45	CPT50130A-45A	CPT50130D-45D			
35-40-45			0.55		CPT50235-45	CPT50235A-45A	CPT50235D-45D			
35-40-45			300		0.65	CPT60035-45	CPT60035A-45A	CPT60035D-45D		
80-90-100					0.85	CPT60080-100	CPT60080A-100A	CPT60080D-100D		
120-150					0.85	CPT600120-50	CPT600120A-50A	CPT600120D-50D		
35-40-45					0.55	CPT60135-45	CPT60135A-45A	CPT60135D-45D		
50-100-150-200		FRED	60		0.98	UFT12505-20	UFT12505A-20A	UFT12505D-20D		
600-700-800					1.35	UFT12760-80	UFT12760A-80A	UFT12760D-80D		
50-100-150-200			100		0.98	UFT20005-20	UFT20005A-20A	UFT20005D-20D		
200-300-400-500					1.25	UFT20120-50	UFT20120A-50A	UFT20120D-50D		
100-150-200					0.98	UFT40010-20	UFT40010A-20A	UFT40010D-20D		

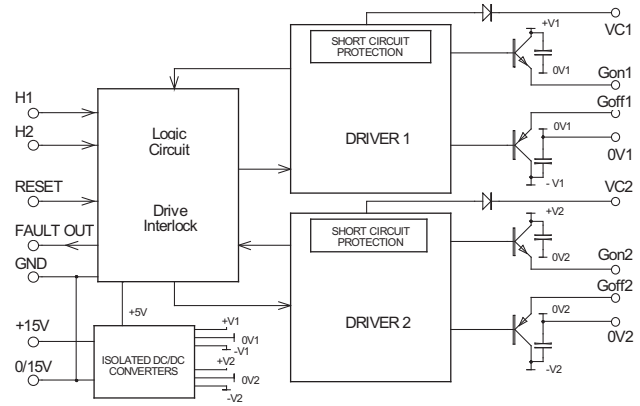


# Dual IGBT Isolated Driver

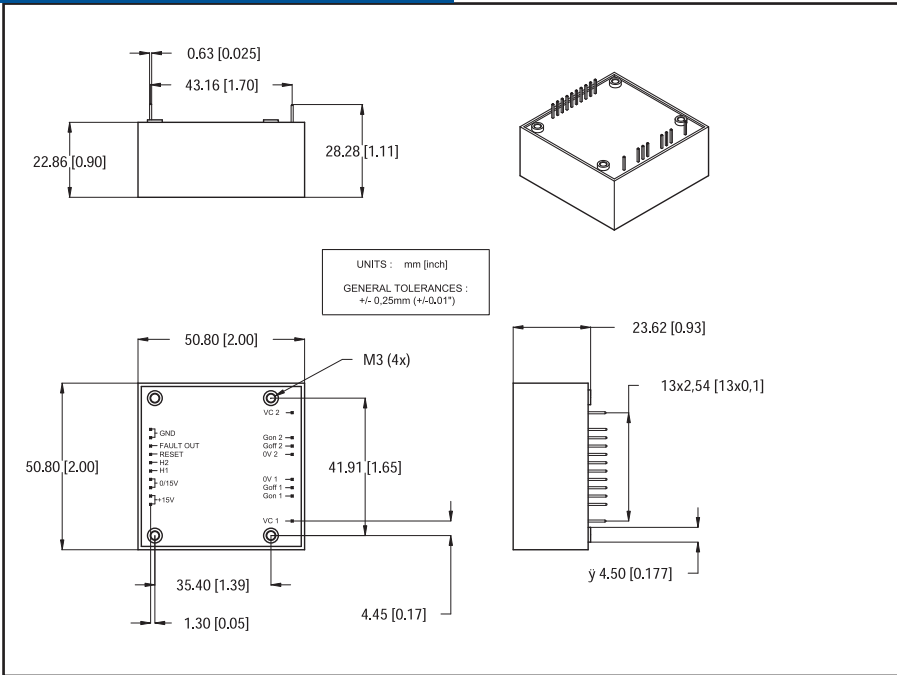
$V_{CE}$ Max (V)	$I_{OUT}$ Peak (A)	Number of Channels	$V_{GON}/V_{GOFF}$	Input Signal Voltage	Switching Freq. (kHz)	Isolation Voltage (kV)	Part Number
1200	8	2	+15/-6	5	50	2.5	APTRG8A120G



- Driver For Phase Leg IGBT up to 300A/1200V or 600A/600V
- Short Circuit Protection
- Under Voltage Lockout
- Integrated Auxillary Power Supplies
- TTL Compatible Inputs
- Very High EMI Immunity
- Fault and Reset Signals
- RGon and RGoFF Externally Selectable
- Dimensions: 50.8mm(H) X 50.8mm(W) X 23.6mm(D)



## DIMENSIONS

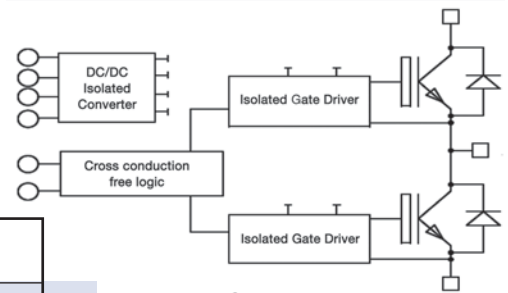


## Intelligent Power Modules

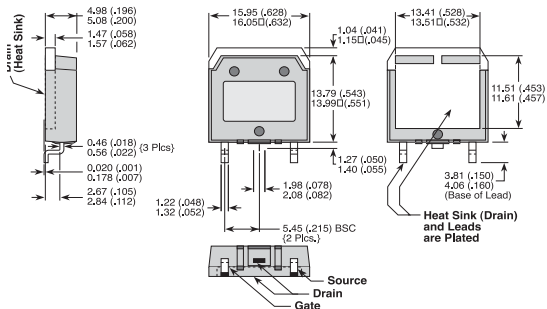
### PHASE LEG

$V_{CES}$ (V)	Technology	$I_C$ (A) $T_C=80^\circ C$	$V_{CE(ON)}$ (V) at rated $I_C$	Package	NTC	Part Number
600	NPT	350	2.1	LP8	N/A	APTLGF350A608G
	TRENCH	400	1.5	LP8	N/A	APTLGT400A608G
1200	NPT	300	3.2	LP8	N/A	APTLGF300A1208G
	TRENCH	300	1.7	LP8	N/A	APTLGT300A1208G
	TRENCH 4	325	1.8	LP8	N/A	APTLGL325A1208G

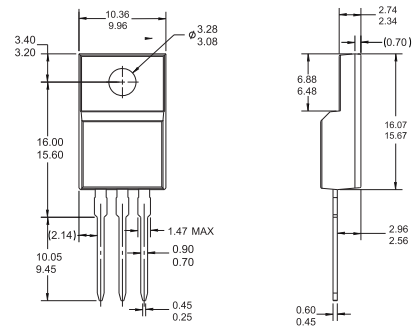
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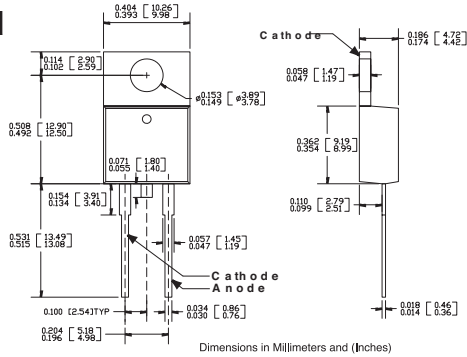
### D<sup>3</sup> Pak or TO-268



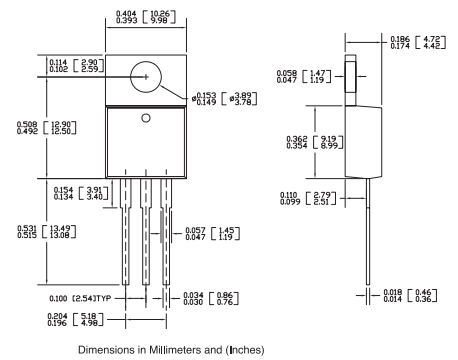
### TO-220 [KF]



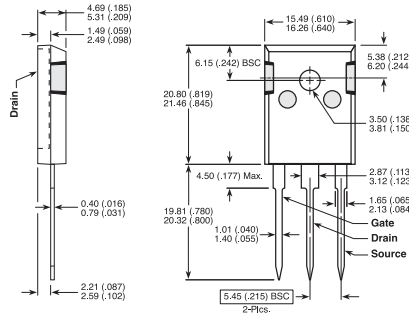
### TO-220 2-Lead



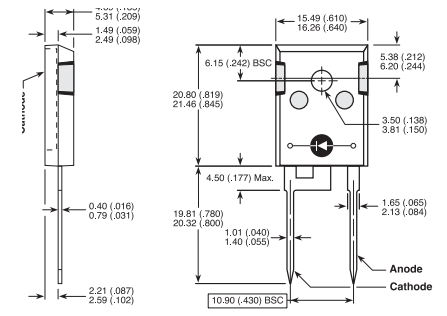
### TO-220 3-Lead



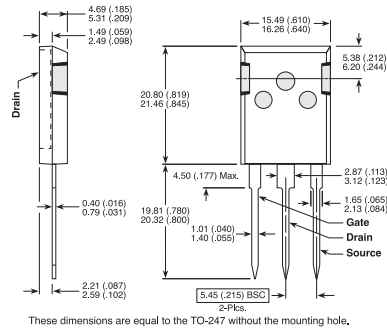
### TO-247 3-Lead



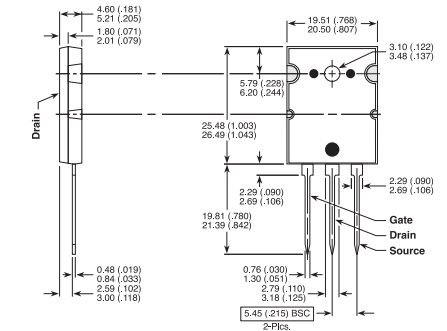
### TO-247 2-Lead



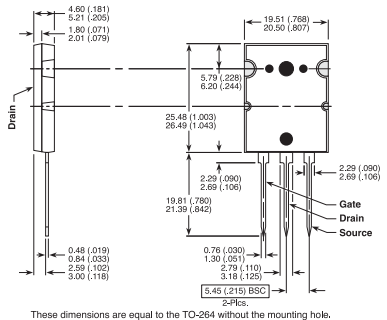
### T-MAX<sup>®</sup>



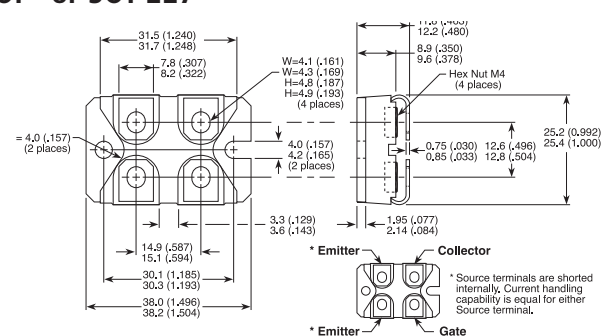
### TO-264



### 264 MAX<sup>™</sup>

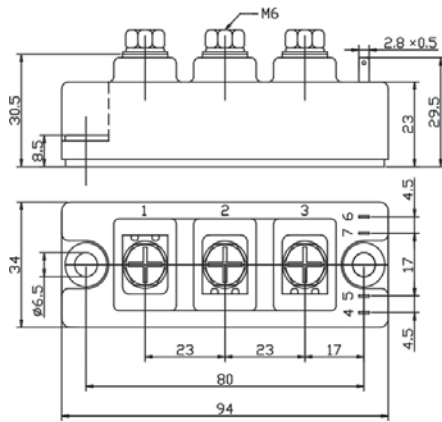


### ISOTOP<sup>®</sup> or SOT-227

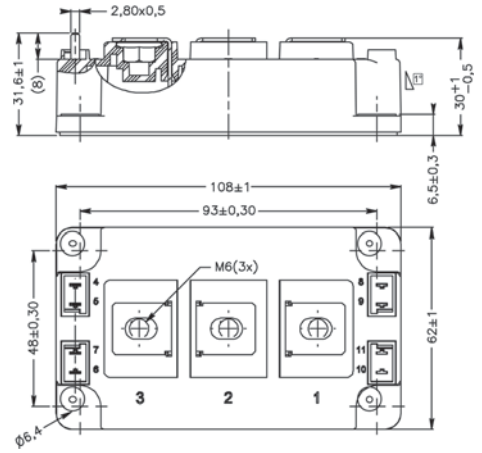


# Power Module Outlines

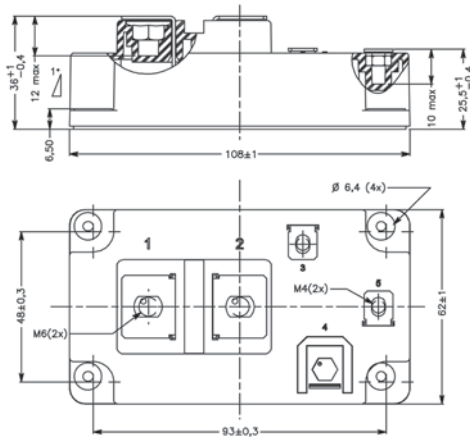
D1



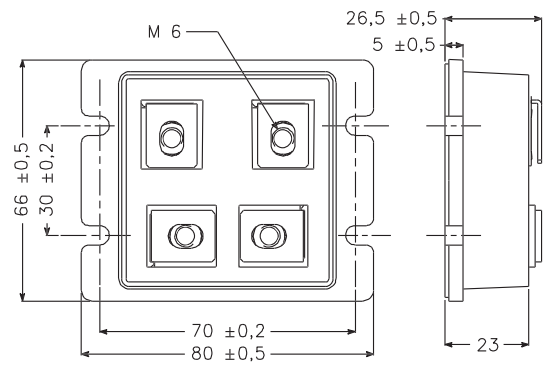
D3



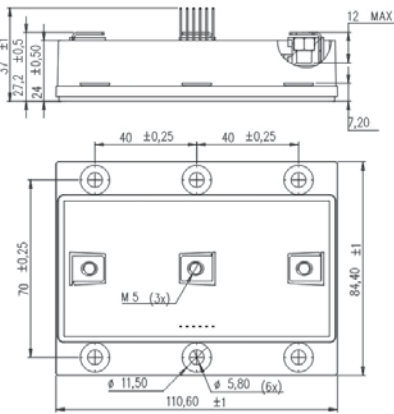
D4



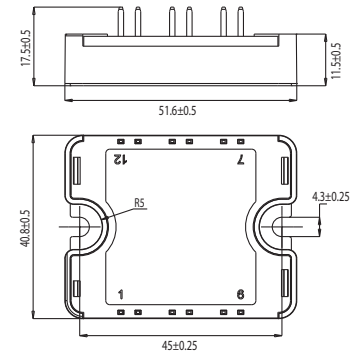
LP4



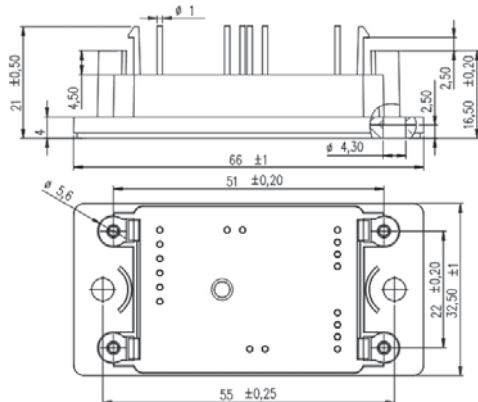
LP8



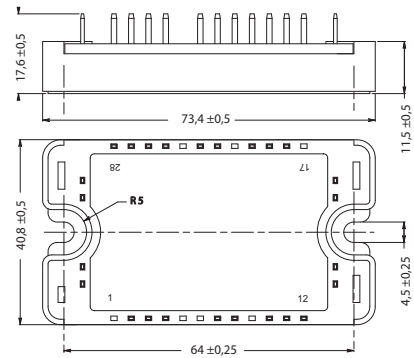
SP1



SP2



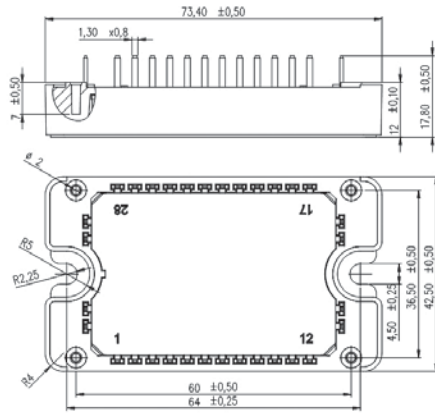
SP3



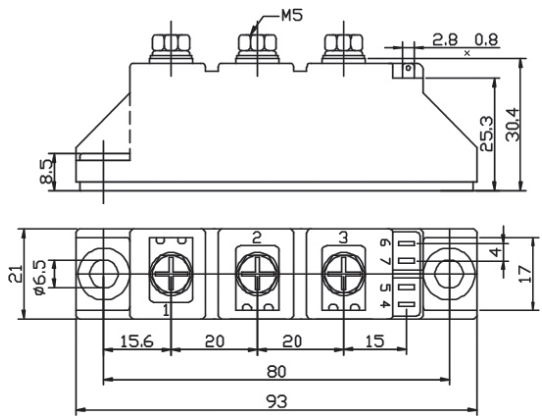
Pin out location depends on the module configuration. Please refer to the product datasheet for pins assignment. All dimensions in millimeters.

# Power Module Outlines

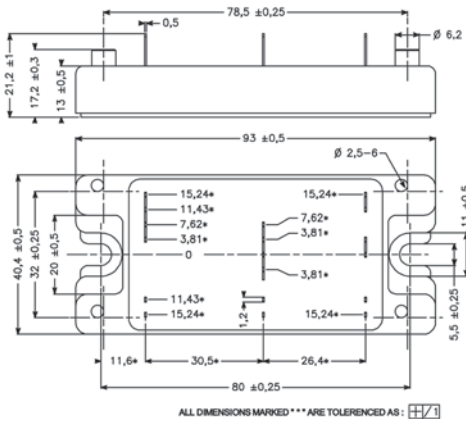
SP3F



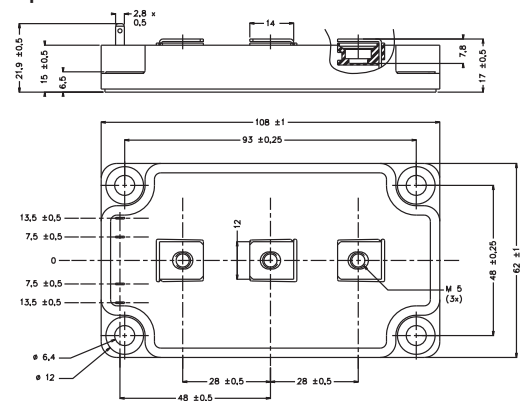
SF1



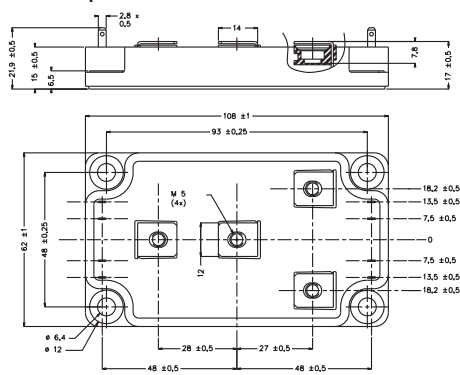
SP4



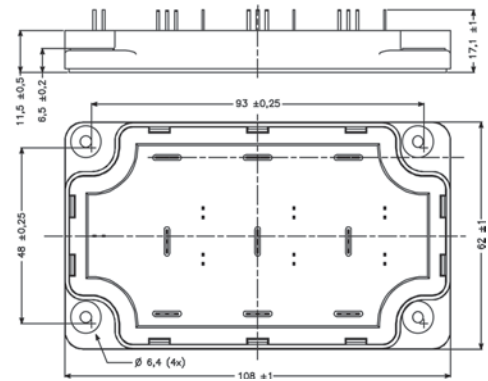
SP6 - 3 outputs



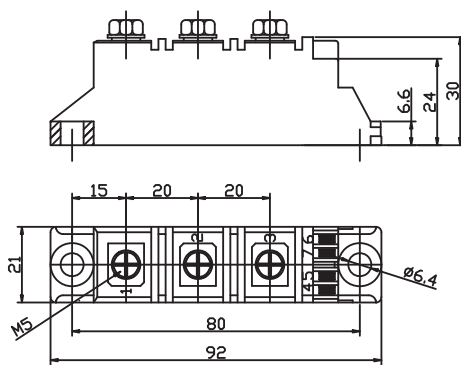
SP6 - 4 outputs



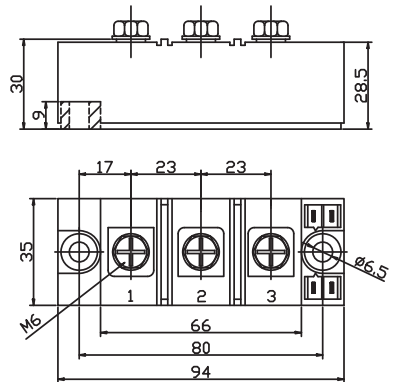
SP6 - P



SD1



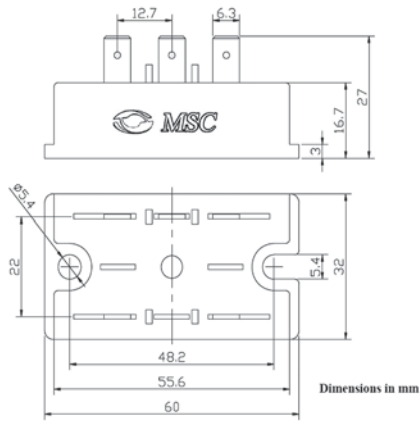
SD2



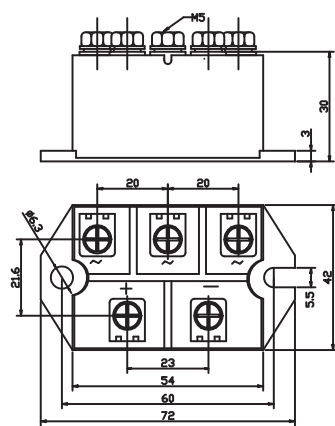
# Power Module Outlines

Pin out location depends on the module configuration. Please refer to the product datasheet for pins assignment. All dimensions in millimeters.

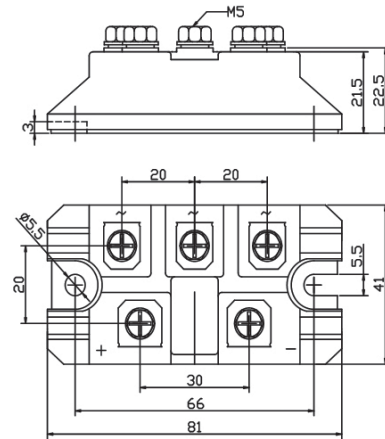
SM1



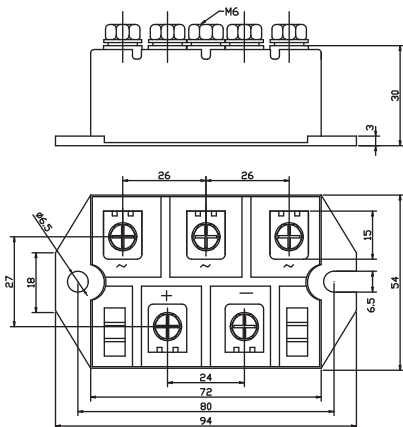
SM2



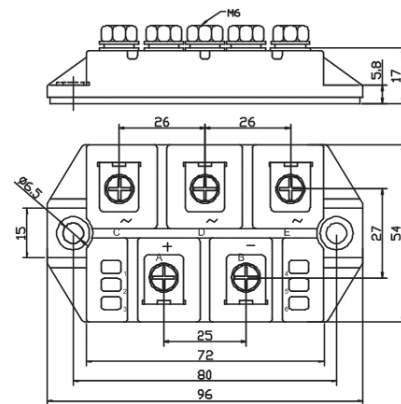
SM2-1



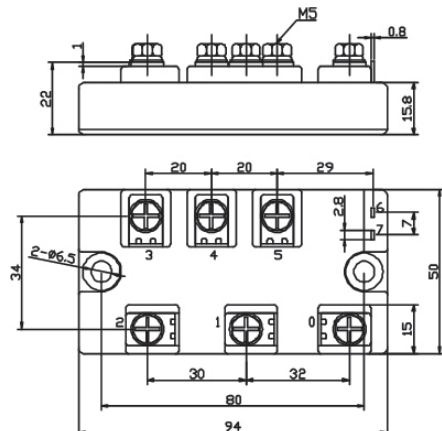
SM3



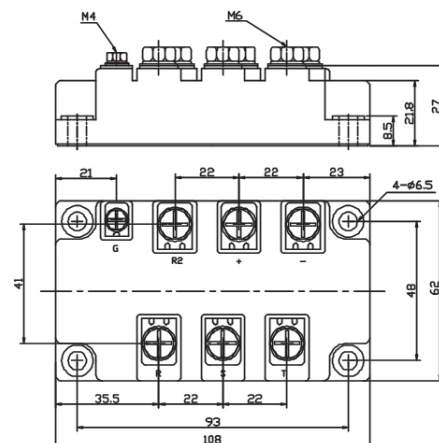
SM3-1



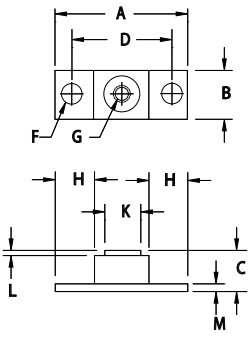
SM4



SM5



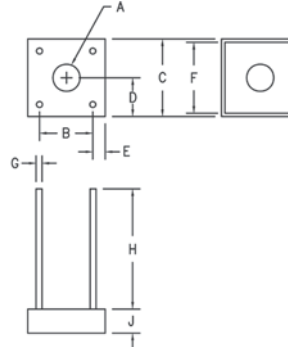
## SDM



Dim.	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	---	2.650	---	67.31	
B	1.240	1.260	31.49	32.00	
C	---	.925	---	23.49	
D	2.00	BSC	50.80	BSC	
F	0.320	0.340	8.13	8.64	Dia.
G	---	---	5/16-18	UNC	
H	0.630	---	16.00	---	
K	0.610	0.640	15.49	16.26	
L	---	.100	---	2.54	
M	0.182	0.192	4.62	4.88	

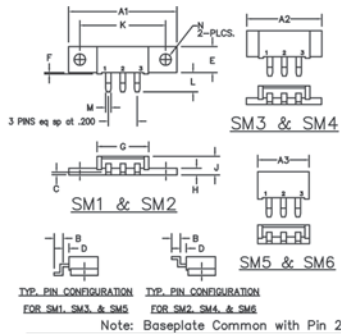
Standard Polarity: Base plate is cathode  
Reverse Polarity: Base plate is anode

## VJ



Dim.	Inches		Millimeter		Notes
	Minimum	Maximum	Minimum	Maximum	
A	.137	.167	3.84	2.21	Dia.
B	.411	.441	10.44	11.20	
C	.600	.620	---	---	
D	.295	.310	---	---	
E	.076	.096	---	---	
F	.545	.555	13.85	14.10	
G	.076	.096	.970	1.07	
H	1.0	Min.	25.40	Min.	
J	.195	.215	4.95	5.46	

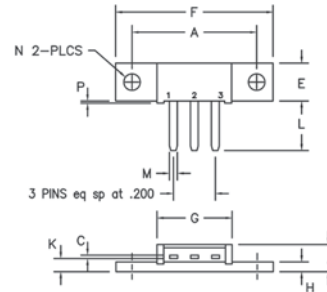
## Mini-Mod Surface Mount



Dim.	Inches		Millimeter		Notes
	Minimum	Maximum	Minimum	Maximum	
A1	1.490	1.510	37.85	38.35	
A2	1.020	1.040	26.12	26.42	
A3	.695	.715	17.65	18.16	
B	.110	.120	2.79	3.04	
C	.027	.037	0.69	0.94	
D	.100	.110	2.54	2.79	
E	.350	.370	8.89	9.40	
F	.015	.025	0.38	0.64	
G	.695	.715	17.65	18.16	
H	.088	.098	2.24	2.49	
J	.240	.260	6.10	6.60	
K	1.180	1.195	29.97	30.35	
L	.230	.250	5.84	6.35	
M	.065	.085	1.65	2.16	
N	.151	.161	3.84	4.09	Dia.

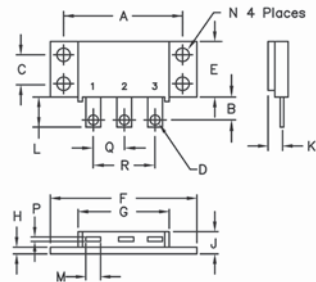
Note: Baseplate Common with Pin 2

## Mini-Mod



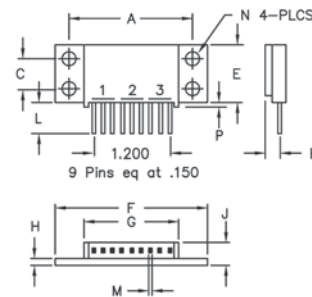
Dim.	Inches		Millimeter		Notes
	Minimum	Maximum	Minimum	Maximum	
A	1.180	1.195	29.97	30.35	
C	.027	.037	0.69	0.94	
E	.350	.370	8.89	9.40	
F	1.490	1.510	37.85	38.35	
G	.695	.715	17.65	18.16	
H	.088	.098	2.24	2.49	
J	.240	.260	6.10	6.60	
K	.115	.135	2.92	3.43	
L	.460	.480	11.68	12.19	
M	.065	.085	1.65	2.16	
N	.151	.161	3.84	4.09	Dia.
P	.015	.025	0.38	0.64	

## TO-249



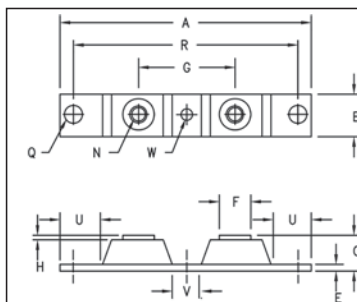
Dim.	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	1.995	2.005	50.67	50.93	
B	0.300	0.325	7.62	8.26	
C	0.495	0.505	12.57	12.83	
D	0.182	0.192	4.62	4.88	Dia.
E	0.990	1.010	25.15	25.65	
F	2.390	2.410	60.71	61.21	
G	1.500	1.525	38.10	38.70	
H	0.120	0.130	3.05	3.30	
J	---	0.400	---	10.16	
K	0.240	0.260	6.10	6.60 to Lead $\phi$	
L	0.490	0.510	12.45	12.95	
M	0.330	0.350	8.38	6.90	
N	0.175	0.195	4.45	4.95	Dia.
P	0.035	0.045	0.89	1.14	
Q	0.445	0.455	11.30	11.56	
R	0.890	0.910	22.61	23.11	

## 9 Pin TO-249



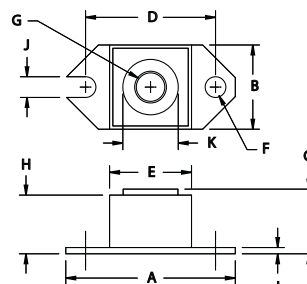
Dim.	Inches		Millimeter		Notes
	Minimum	Maximum	Minimum	Maximum	
A	1.995	2.005	50.67	50.93	
C	0.495	0.506	12.57	12.83	
E	0.990	1.010	25.15	25.65	
F	2.390	2.410	60.71	61.21	
G	1.490	1.510	37.85	38.35	
H	0.120	0.130	3.05	3.30	
J	---	0.400	---	10.16	
K	0.240	0.260	6.10	6.60 to Lead $\phi$	
L	0.490	0.510	12.45	12.95	
M	0.040	.050	1.02	1.27	Square Dia
N	0.175	0.195	4.45	4.95	
P	0.032	0.052	0.81	1.32	

## Twin Tower



Dim.	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	---	3.630	---	92.20	
B	0.700	0.800	17.78	20.32	
C	---	0.630	---	16.00	
E	0.120	0.130	3.05	3.30	
F	0.490	0.510	12.45	12.95	
G	1.375	BSC	34.92	BSC	
H	0.010	---	0.25	---	
N	---	---	---	---	
Q	0.275	0.290	6.99	7.37	
R	3.150	BSC	80.01	BSC	
U	0.600	---	15.24	---	
V	0.312	0.340	7.92	8.64	
W	0.180	0.195	4.57	4.95	

## Half Pak



Dim.	Inches		Millimeter		Notes
	Minimum	Maximum	Minimum	Maximum	
A	1.52	1.56	38.61	39.62	
B	.725	.775	18.42	19.69	
C	.605	.625	15.37	15.88	
D	1.182	1.192	30.02	30.28	
E	.745	.755	18.92	19.18	Sq.
F	.152	.160	3.86	4.06	Dia.
G	---	1/4-20	UNC-28	---	
H	.525	.580	13.34	14.73	
J	.156	.160	3.96	4.06	
K	.495	.505	12.57	12.83	Dia.
L	.120	.130	3.05	3.30	

Std. Polarity: Base is cathode  
Rev. Polarity: Base is anode



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