

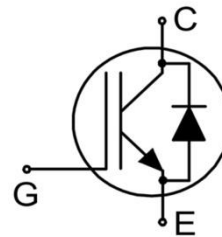
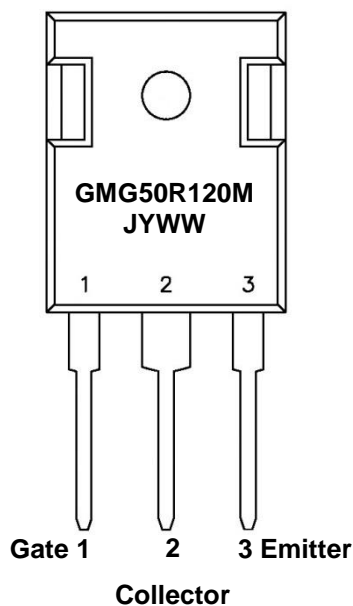
## Features

- ◆ Trench Field Stop technology
- ◆ Fast Switching Characteristics
- ◆ Low Turnoff Voltage Spike
- ◆ Ultrafast Recovery Diode embedded
- ◆ Low Forward Voltage
- ◆ Low Leakage Current

## Applications

- ◆ Inverter Welding Machine
- ◆ Uninterruptable Power System, UPS

## Marking Information and Pin Assignment – TO-264 (Top View)



J: Assembly / Test Site Code  
Y: Year  
WW: Week



# GMG50R120M

50A, 1200V, Fast Switching IGBT

## Order Information

Ordering Number	Package	Shipping
GMG50R120MTD3T	TO-264	30 Units/Tube. 20 Tubes/Box, 5 Boxes/Carton

## Absolute Maximum Ratings (Note 1)

SYMBOL	PARAMETER		RATINGS	UNITS
$V_{CES}$	Collector to Emitter Voltage		1200	V
$I_C$	Collector Current	$T_C = 25^{\circ}\text{C}$	100	A
		$T_C = 100^{\circ}\text{C}$	50	
$I_{CP}$ (Note 2)	Collector Pulse Current		150	A
$I_F$	Diode Forward Current	$T_C = 25^{\circ}\text{C}$	50	A
		$T_C = 100^{\circ}\text{C}$	25	
$I_{FP}$ (Note 2)	Diode Pulse Current		120	A
$t_{SC}$	Short Circuit Withstand Duration, $V_{GE}=15\text{V}$ , $V_{CC}=400\text{V}$ , $T_J \leq 150^{\circ}\text{C}$		10	$\mu\text{s}$
$V_{GE}$	Gate-Emmitter Voltage		$\pm 20$	V
$P_{TOT}$	Power dissipation,	$T_C = 25^{\circ}\text{C}$	416	W
		$T_C = 100^{\circ}\text{C}$	166	
$T_J$	Maximum IGBT Junction Temperature		$-55 \sim 150$	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature Range		$-55 \sim 150$	$^{\circ}\text{C}$

Note 1 Compliance to JESD-022

Note 2 Simulated Results

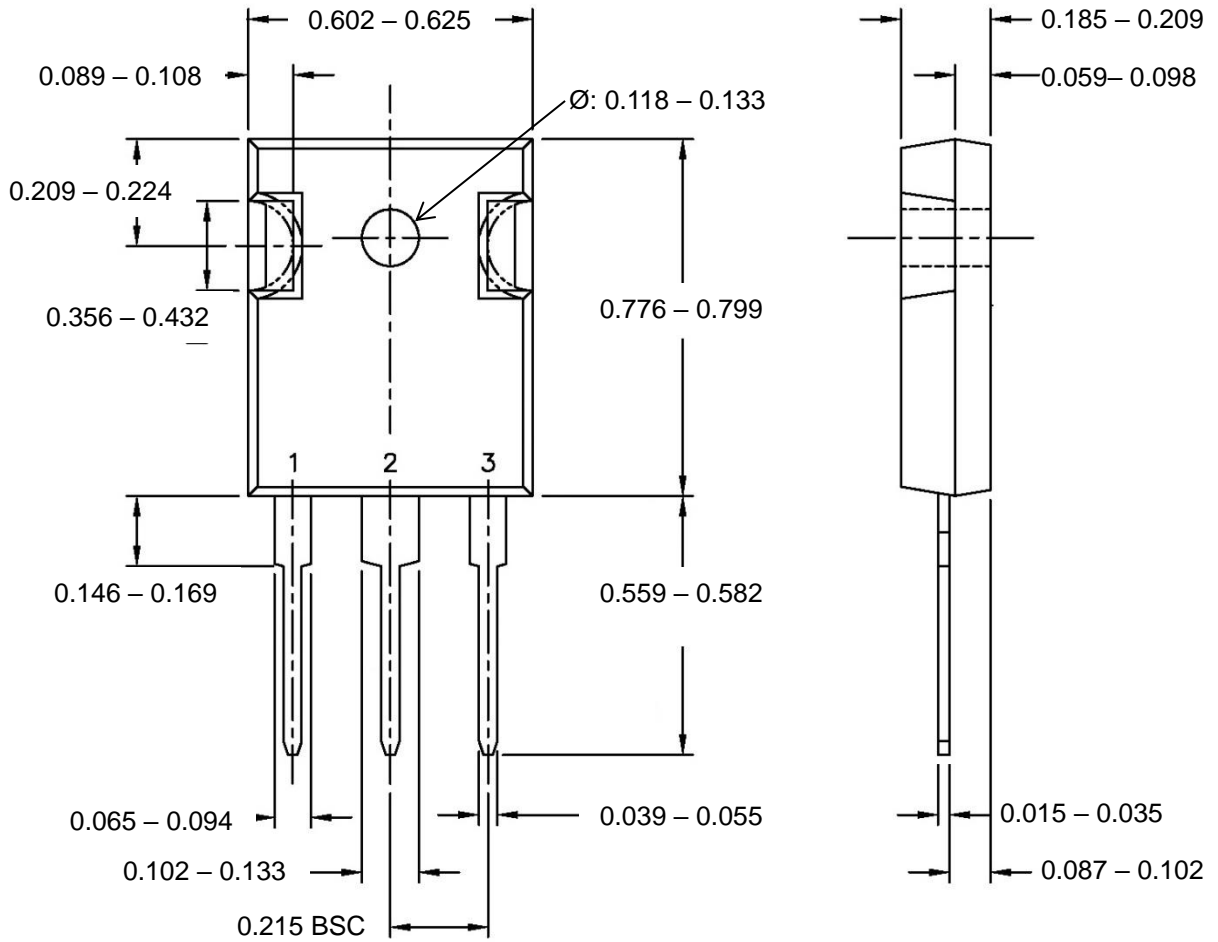
Note 3 Short Circuit < 1000 times, Short Circuit Interval: > 1s

## Electrical Characteristics (T<sub>J</sub> = 25°C, unless otherwise noted)

Parameter	Symbol	Condition		Min	Typ	Max	Unit	
Statistic Characteristic								
Collector to Emitter Breakdown Voltage	V <sub>BR,CE</sub>	V <sub>GE</sub> =0V, I <sub>C</sub> =250μA		1200			V	
Collector to Emitter Saturation Voltage	V <sub>CE,SAT</sub>	V <sub>GE</sub> =15V, I <sub>C</sub> =50A	T <sub>J</sub> =25°C		2.0	2.4	V	
			T <sub>J</sub> =150°C		2.5			
Diode Forward Voltage	V <sub>F</sub>	V <sub>GE</sub> =0V, I <sub>F</sub> =25A	T <sub>J</sub> =25°C		2.9		V	
			T <sub>J</sub> =150°C		2.1			
Gate Threshold Voltage	V <sub>GE</sub>	I <sub>C</sub> =0.25mA, V <sub>CE</sub> =V <sub>GE</sub>		4	5.8	7	V	
Collector Leakage Current	I <sub>CES</sub>	V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V	T <sub>J</sub> =25°C			0.1	mA	
			T <sub>J</sub> =150°C			4		
Gate Leakage Current	I <sub>GES</sub>	V <sub>GE</sub> =20V, V <sub>CE</sub> =0V				250	nA	
Transconductance	g <sub>FS</sub>	V <sub>CE</sub> =20V, I <sub>C</sub> =50A			27		S	
Dynamic Characteristic								
Input Capacitance	C <sub>ISS</sub>	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz			3900		pF	
Output Capacitance	C <sub>OSS</sub>				180		pF	
Reverse Transfer Capacitance	C <sub>RES</sub>				101		pF	
Gate Charge	Q <sub>G</sub>	V <sub>CC</sub> =600V, I <sub>C</sub> =40A, V <sub>GE</sub> =15V			261		nC	
IGBT Switching Characteristic								
Turn ON Delay time	t <sub>D(ON)</sub>	V <sub>CC</sub> =600V, I <sub>C</sub> =50A, V <sub>GE</sub> =0/15V, R <sub>G</sub> =10Ω, inductive load	T <sub>J</sub> =25°C		65		ns	
Rise Time	t <sub>r</sub>				57			
Turn OFF delay time	t <sub>D(OFF)</sub>				277			
Fall Time	t <sub>f</sub>				40		mJ	
Turn ON Energy Loss	E <sub>ON</sub>				3.6			
Turn OFF Energy Loss	E <sub>OFF</sub>				1.6			
Switching Energy Loss	E <sub>ts</sub>				5.2		ns	
Turn ON Delay time	t <sub>D(ON)</sub>		T <sub>J</sub> =150°C		60			
Rise Time	t <sub>r</sub>				58			
Turn OFF delay time	t <sub>D(OFF)</sub>				325			
Fall Time	t <sub>f</sub>				85			
Turn ON Energy Loss	E <sub>ON</sub>				3.9			mJ
Turn OFF Energy Loss	E <sub>OFF</sub>				2.2			
Switching Energy Loss	E <sub>ts</sub>				6.1			
Diode Switching Characteristic								
Reverse Recovery Time	t <sub>rr</sub>	V <sub>R</sub> =600V, I <sub>F</sub> =20A, dI <sub>F</sub> /dt = 100A/μs			95		ns	
Reverse Recovery Charge	Q <sub>rr</sub>				0.2		μC	
Reverse Recovery Peak Current	I <sub>rrm</sub>				6.8		A	

## Package Dimension – TO247

Unit: Inches



## Ordering Number

**GM G 40R120M TD3 I**

APM Gamma Micro	Product Category	Short Description	Package Type	Shipping Type
	Discrete IGBT	40: $I_C = 40A$ 120: $V_{CE} = 1200V$	TD3: 3L TO247	T: Tube

Note:

### Green products:

- ♦ Halogen free(Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight)