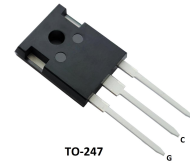


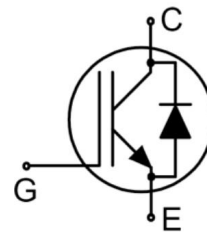
### Features

- Low gate charge
- FS Technology
- saturation voltage:  
VCE(sat), typ = 2.2V @  
IC = 15A and TC = 25° C
- RoHS product



### Applications

- General purpose inverters
- Induction heating(IH)
- UPS



### Absolute Ratings (Tc=25°C)

Parameter	Symbol	Value	Unit
Collector-Emmitter Voltage	V <sub>CES</sub>	1200	V
*Collector Current-continuous	I <sub>C</sub> T=25°C T=100°C	30	A
		15	A
Collector Current-pulse(note 1)	I <sub>CM</sub>	40	A
Diode Continuous forward current	I <sub>F</sub> T=100°C	15	A
Diode Maximum Forward Current (Note 1)	I <sub>FM</sub>	40	A
Gate-Emmitter Voltage	V <sub>GES</sub>	±30	V
Power Dissipation(TO-247)	P <sub>D</sub> T <sub>C</sub> =25°C	125	W
Power Dissipation(TO-263)	P <sub>D</sub> T <sub>C</sub> =25°C	182	W
Operating Temperature Range	T <sub>J</sub>	-55~+150	°C
Storage Temperature Range	T <sub>STG</sub>	-55~+150	°C
Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	300	°C

\*Collector current limited by maximum Junction temperature

### Electrical Characteristic(TC=25°C unless otherwise noted )

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
<b>Off-Characteristics</b>						

Collector-Emmitter Voltage	$BV_{CES}$	$I_C=500\mu A, V_{GE}=0V$	1200	-	-	V
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V, T_C=25^\circ C$	-	-	0.2	mA
		$T_C=100^\circ C$	-	-	2	mA
Gate-body leakage current, reverse	$I_{GESR}$	$V_{CE}=0V, V_{GE}=-20V$	-	-	-100	nA
<b>On-Characteristics</b>						
Gate-Emmitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=600\mu A$	4.5	-	6.5	V
Short Collector Current <sup>2</sup>	$I_{CSC}$	$V_{GE}=15V, V_{CE}=600V, T_{sc}<10\mu S, T_C=25^\circ C$	-	80	-	A
Collector-Emmitter saturation Voltage	$V_{CESAT}$	$V_{GE}=15V, I_C=15A, T_C=25^\circ C$	-	2.2	2.5	V
		$T_C=125^\circ C$	-	2.4	-	V
		$T_C=150^\circ C$	-	2.5	-	V
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz,$	-	1030	1800	pF
Output capacitance	$C_{oes}$		-	80	120	pF
Reverse transfer capacitance	$C_{res}$		-	50	100	pF
Total Gate Charge	$Q_g$	$V_{CC}=600V, I_C=15A, V_{GE}=15V$ <sup>3,4</sup>	-	70	-	nC
<b>Switching Characteristics</b>						
Turn-On delay time	$t_d(on)$	$V_{CE}=600V, I_C=15A, R_G=10\Omega, \text{Inductive load } T_C=25^\circ C$	-	80	-	ns
Turn-On rise time	$t_r$		-	65	-	ns
Turn-off delay time	$t_d(off)$		-	180	-	ns
Turn-off Fall time	$t_f$		-	80	-	ns
Turn-on energy	$E_{on}$		-	2.2	-	mJ
Turn-off energy	$E_{off}$		-	1.1	-	mJ
Total switching Energy	$E_{tot}$		-	3.2	-	mJ
<b>Anti-Paraller Diode Characteristics and Maximum Ratings</b>						
Diode Forward Voltage	$V_F$	$V_{GE}=0V, I_F=15A.$	-	1.8	2.9	V
Diode Reverse recovery time	$t_{rr}$	$V_{GE}=0V, V_R=800V, I_F=15A, di_F/dt=750A/\mu s$ <sup>4</sup>	-	200	-	ns
Reverse recovery charge	$Q_{rr}$		-	1.1	-	$\mu C$

### Thermal Characteristics

Symbol	Parameter	Max		Units
		TO-247	TO-263	
$R_{th\ j-c}$	Thermal Resistance, Junction to case	2	0.82	$^{\circ}C/W$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	48	62.5	$^{\circ}C/W$

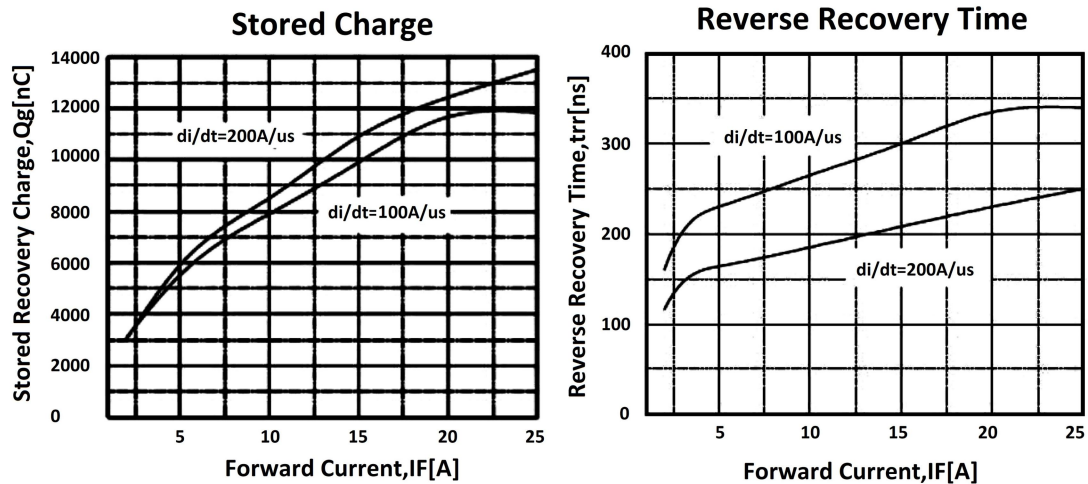
Notes:

- 1: Pulse width limited by maximum junction temperature
- 2: Allowed number of short circuits: <1000; time between short circuits: >1s.
- 3: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$
- 4: Essentially independent of operating temperature

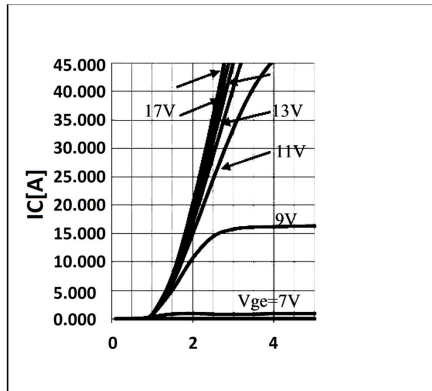
### Order Message

Marking	Package
MSG15T120FPC	TO-247
MSG15T120FPE	TO-263

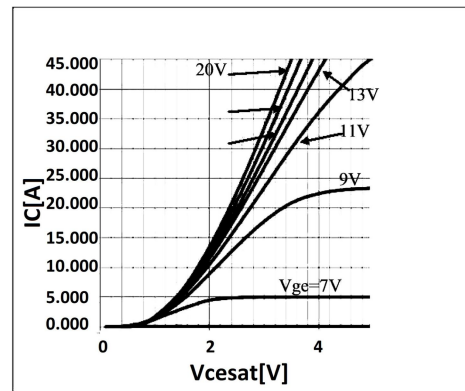
### Electrical Characteristics(curves)



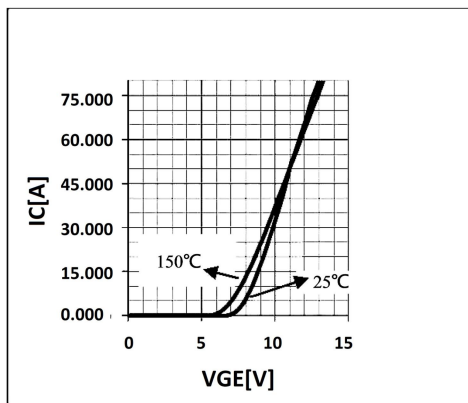
**Typical Output Characteristics,  $T_j = 25^\circ\text{C}$**



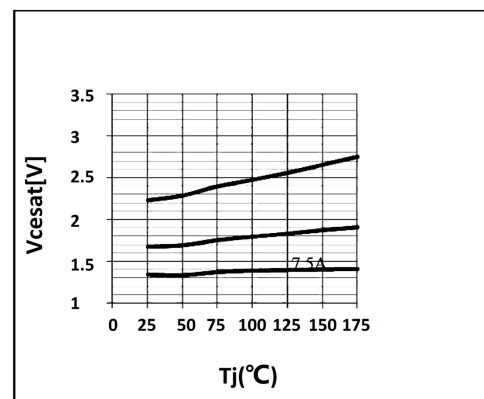
**Typical Output Characteristics,  $T_j = 150^\circ\text{C}$**



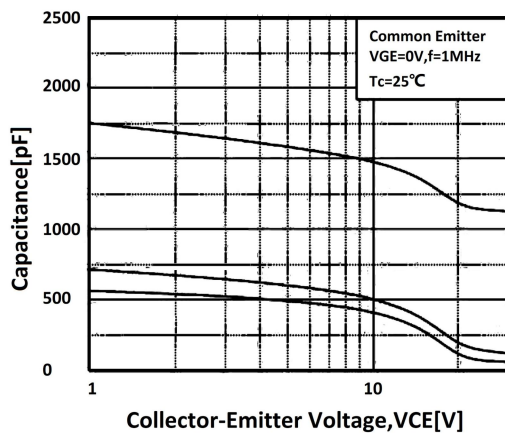
**Typical Saturation Voltage Characteristics**



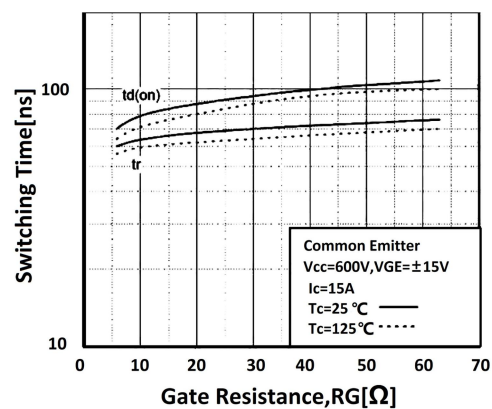
**Saturation Voltage vs. Case Temperature at Vaient Current Level**



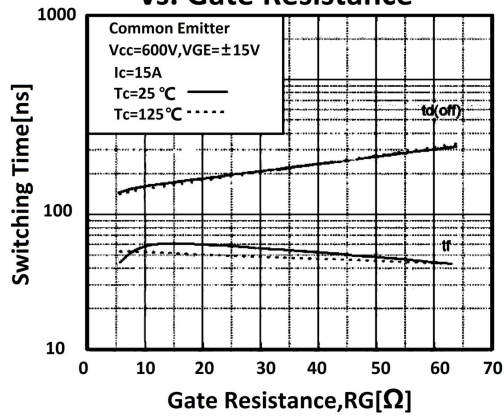
**Capacitance Characteristics**



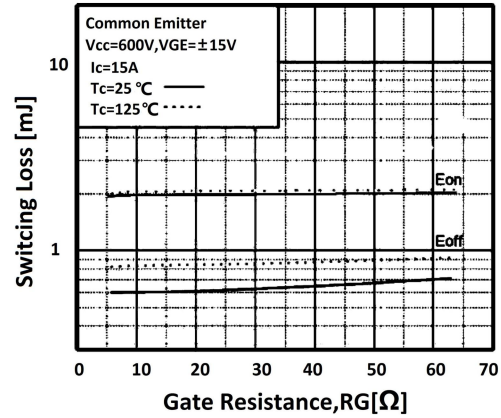
**Turn-On Characteristics vs. Gate Resistance**



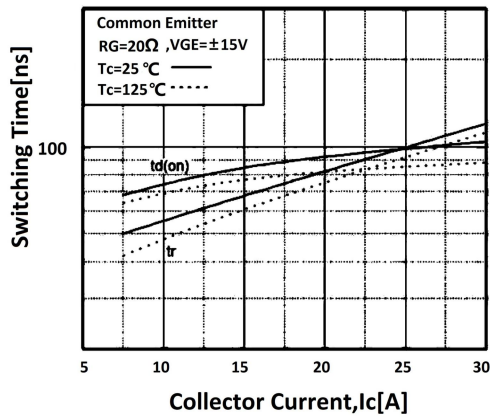
### Turn-off Characteristics vs. Gate Resistance



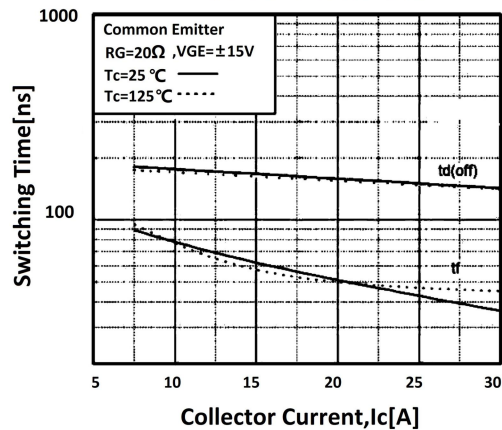
### Switching Loss vs. Gate Resistance



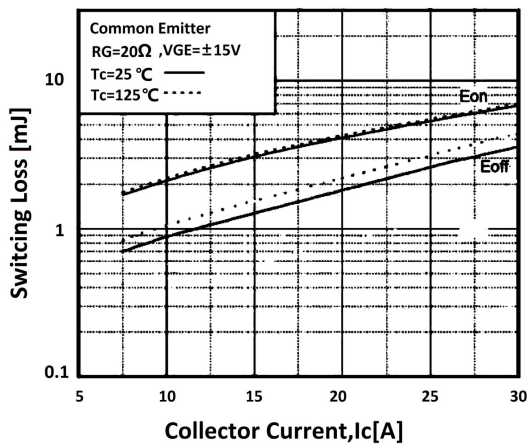
### Turn-On Characteristics vs. Collector Current



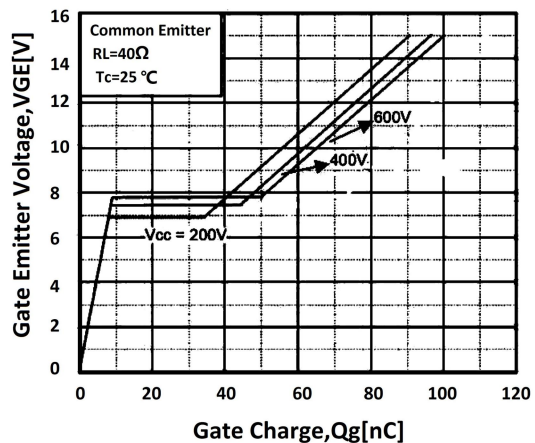
### Turn-off Characteristics vs. Collector Current



### Switching Loss vs. Collector Current

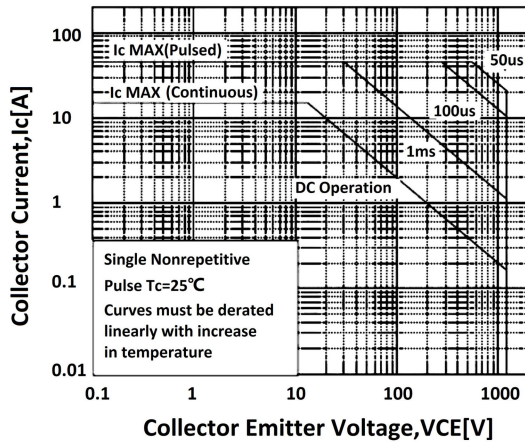


### Gate Charge Characteristics

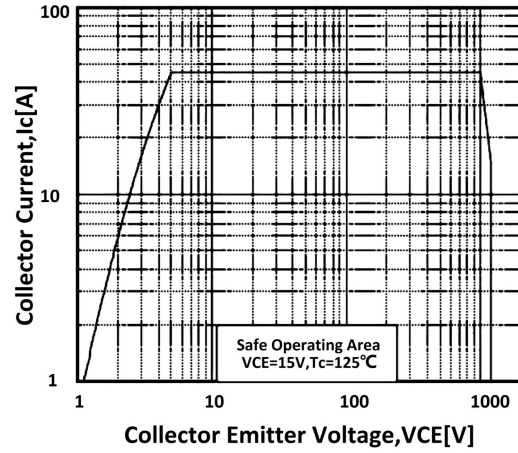




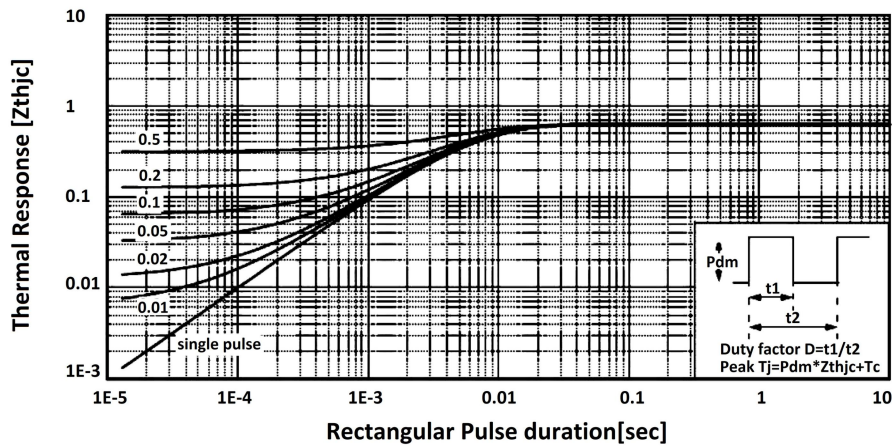
### SOA Characteristics



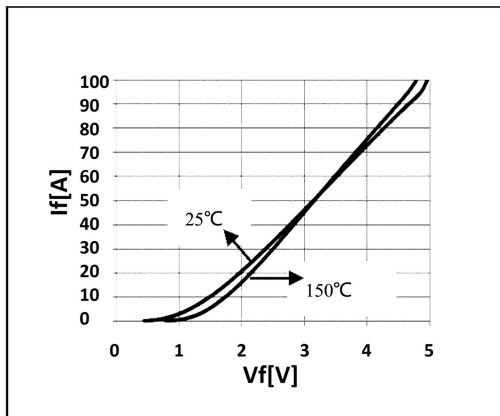
### Turn-Off SOA



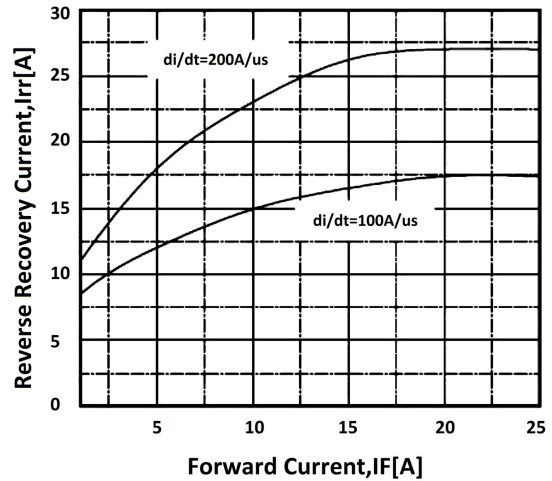
### Transient Thermal Impedance



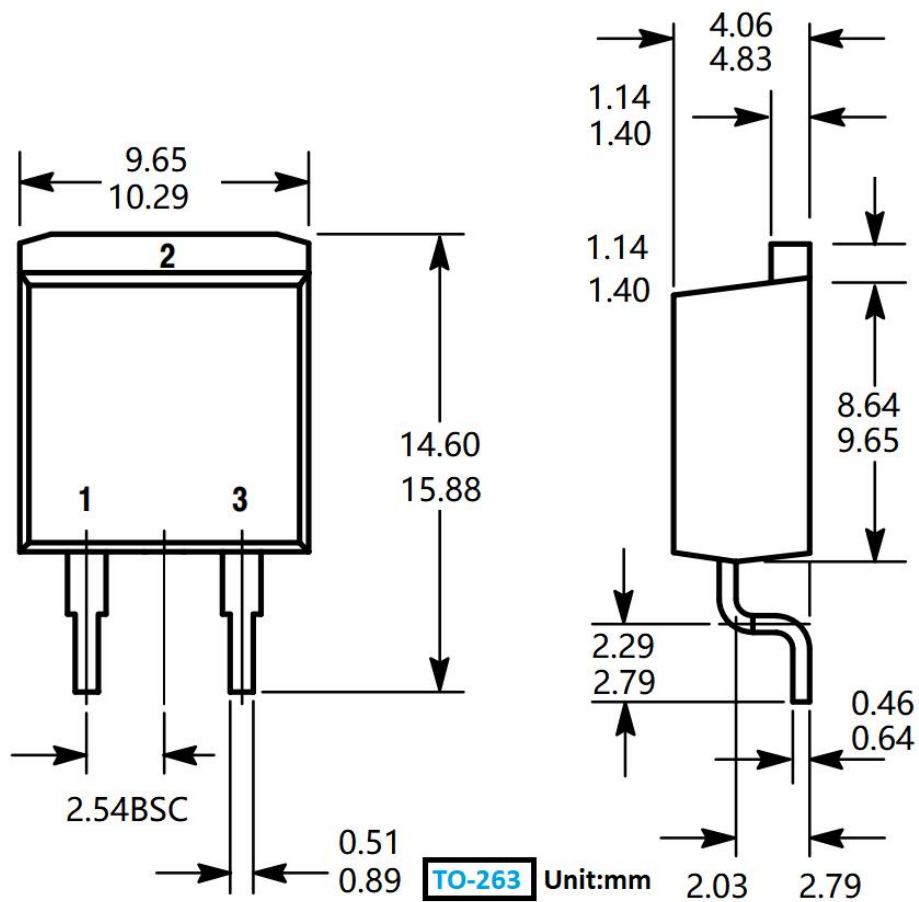
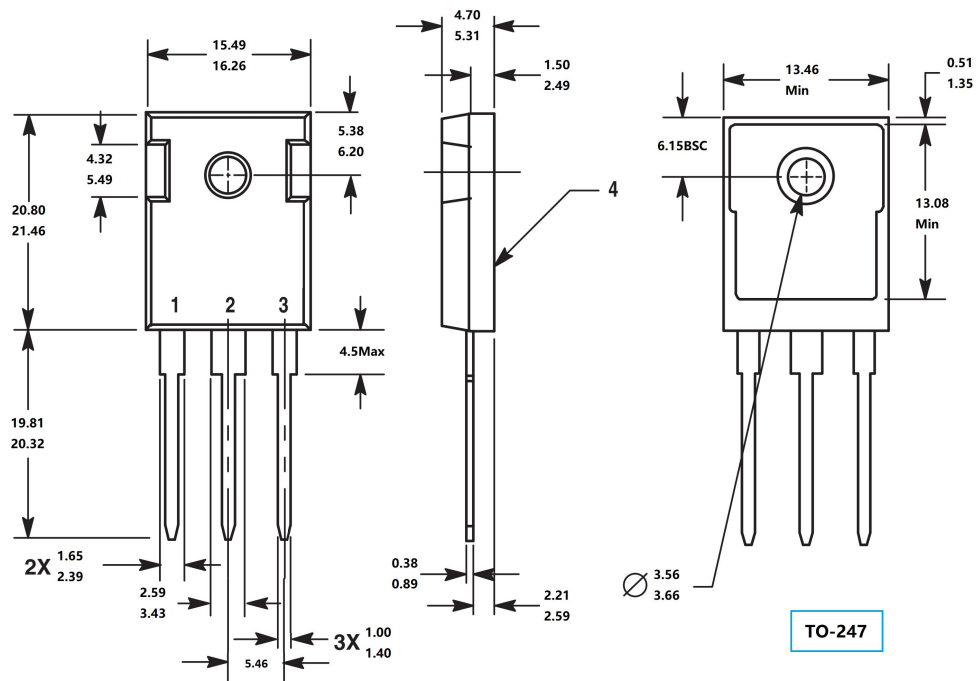
### Forward Characteristics



### Reverse Recovery Current



### Package Mechanical DATA



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