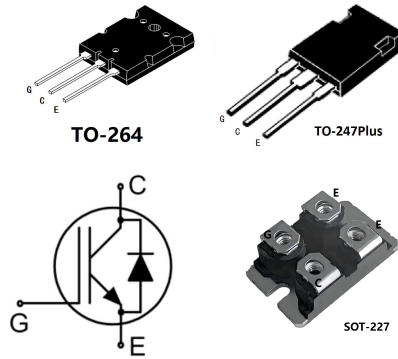


## Features

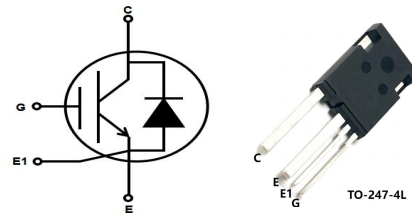
- Very Low Saturation Voltage:  
VCE(sat) = 1.65V @ IC = 100 A
- Maximum Junction Temperature: TJ = 175°C
- Positive Temperature Co-Efficient
- Tight Parameter Distribution
- High Input Impedance



## Applications

- Traction Inverter for HEV/EV
- Auxiliary DC/AC Converter
- Motor Drives
- Other Power-Train Applications  
Requiring High Power Switch

## MSG100T65HLB3/C1/F4



## MSG100T65HLC6

## Absolute Ratings(Tc=25°C)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>ce</sub>	650	V
Collector Current-continuous	I <sub>c</sub>	T=25°C	200
		T=100°C	100
Diode forward current	I <sub>F</sub>	T=25°C	150
		Tc=100°C	75
Collector Current-pulse (note 1)	I <sub>CM</sub>	300	A
Gate-Emitter Voltage	V <sub>GES</sub>	±20	V
Power Dissipation (TO-264, TO-247Plus, TO-247-4L)	PD	750	W
Power Dissipation(SOT-227)	PD	1000	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~+150	°C
Short Circuit Withstand Time	t <sub>sc</sub>	5	us
Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	300	°C
Isolation Voltage for Case-Terminal	V <sub>ISO</sub>	3.0	KV

**Electrical Characteristics**( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
<b>Off-Characteristics</b>						
Collector-Emitter Voltage	$BV_{CES}$	$I_c=1.6\text{mA}, V_{GE}=0\text{V}$	650	-	-	V
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE}=650\text{V}, V_{GE}=0\text{V},$	-	-	2	$\mu\text{A}$
Gate-body leakage current, forward	$I_{GESF}$	$V_{CE}=0\text{V}, V_{GE}=20\text{V}$	-	-	100	nA
Gate-body leakage current, reverse	$I_{GESR}$	$V_{CE}=0\text{V}, V_{GE}=-20\text{V}$	-	-	-100	nA
<b>On-Characteristics</b>						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_c=0.6\text{mA}$	3.5	5.0	6.5	V
Collector-Emitter saturation Voltage	$V_{CESAT}$	$V_{GE}=15\text{V}, I_c=100\text{A}$	-	-	1.65	V
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{ies}$	$V_{CE}=30\text{V},$ $V_{GE}=0\text{V},$ $f=1.0\text{MHZ}$	-	5012	-	pF
Output capacitance	$C_{oes}$		-	430	-	pF
Reverse transfer capacitance	$C_{res}$		-	100	-	pF

**Electrical Characteristics**( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400\text{V}, I_c=100\text{A},$ $R_G=4.7\Omega, V_{GE}=15\text{V},$ Inductive Load $T_c=25^{\circ}\text{C}$	-	84	-	ns
Turn-On rise time	$t_r$		-	147	-	ns
Turn-Off delay time	$t_{d(off)}$		-	216	-	ns
Turn-Off Fall time	$t_f$		-	133	-	ns
Turn-on Loss	$E_{on}$		-	5.4	-	mJ
Turn-off Loss	$E_{off}$		-	3.8	-	mJ
Total Loss	$E_{ts}$		-	9.2	-	mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400\text{V}, I_c=100\text{A},$ $R_G=4.7\Omega, V_{GE}=15\text{V},$ Inductive Load $T_c=175^{\circ}\text{C}$	-	80	-	ns
Turn-On rise time	$t_r$		-	160	-	ns
Turn-Off delay time	$t_{d(off)}$		-	244	-	ns
Turn-Off Fall time	$t_f$		-	166	-	ns

Turn-on switching Loss	$E_{on}$	$V_{CC}=400V, I_C=100A$ $V_{GE}=15V$	-	9.7	-	mJ
Turn-off switching Loss	$E_{off}$		-	5.2	-	mJ
Total switching Loss	$E_{ts}$		-	14.9	-	mJ
Gate Charge	$Q_g$		-	157	-	nC
Gate to Emitter Charge	$Q_{ge}$		-	43	-	nC
Gate to Collector Charge	$Q_{gc}$		-	64	-	nC
<b>Anti-Parallel Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Voltage	$V_F$	$I_F=75A(T_J=25^\circ C)$	-	1.6	-	V
Diode Reverse recovery time	$t_{rr}$	$I_F=75A$ $di_F/dt=200A/us$ $T_J=25^\circ C$	-	62	-	ns
Diode Reverse recovery charge	$Q_{rr}$		-	164	-	nC

### Thermal Characteristic

Parameter	Symbol	Max				Unit
		TO-264	TO-247Plus	TO-247-4L	SOT-227	
Thermal Resistance, Junction to Case (IGBT)	$R_{th(j-c)}$	0.2			0.145	$^\circ C/W$
Thermal Resistance, Junction to Case (Diode)	$R_{th(j-c)}$	0.3			0.25	$^\circ C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	25			10	$^\circ C/W$

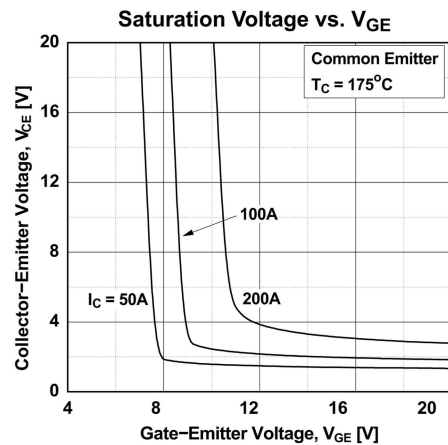
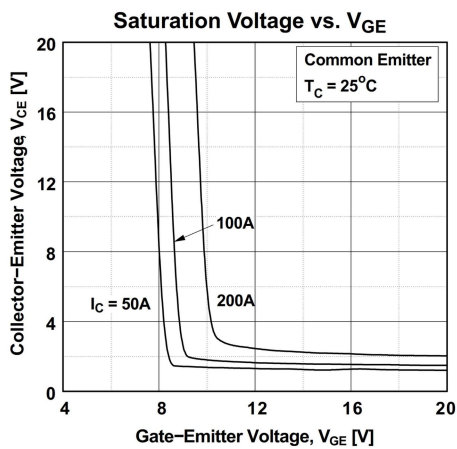
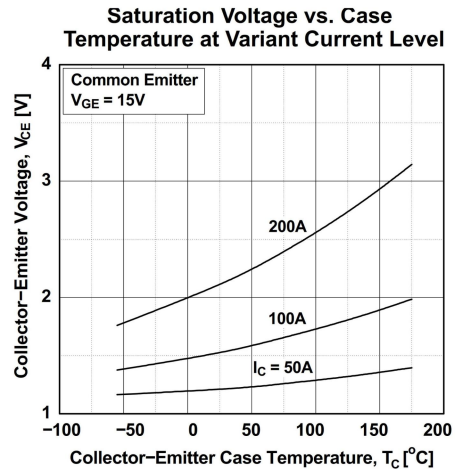
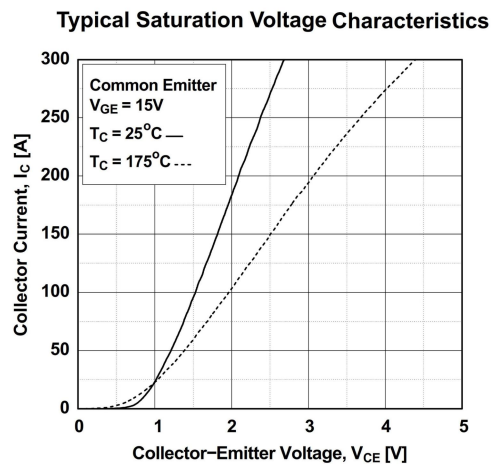
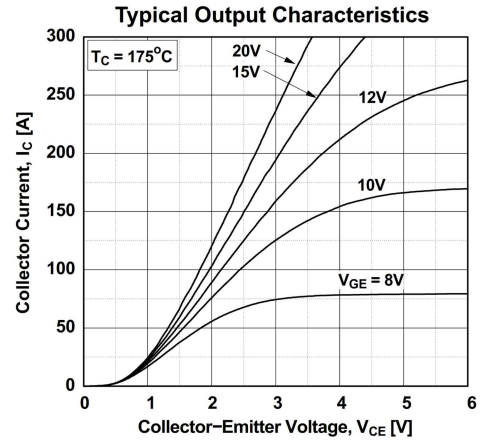
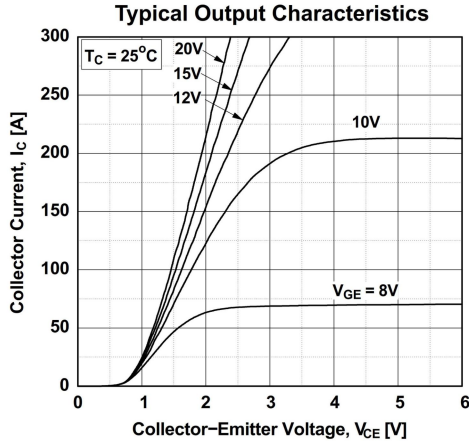
#### Notes:

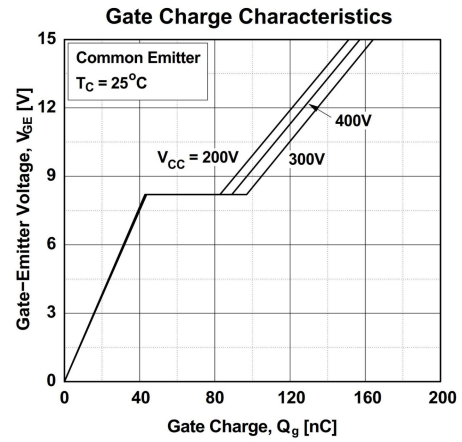
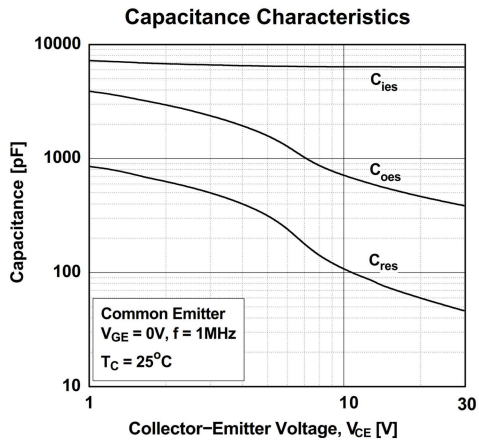
1. Repetitive Rating: Pulse width limited by maximum junction temperature

### Order Information

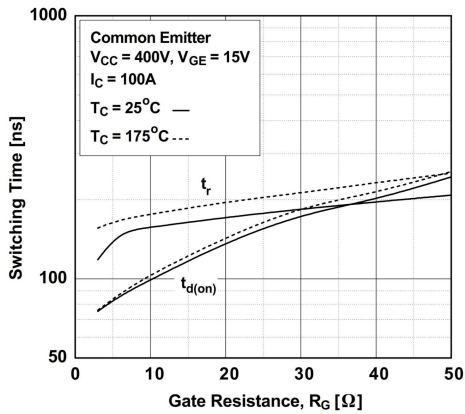
type specification	packaging
MSG100T65HLB3	TO-264
MSG100T65HLC1	TO-247Plus
MSG100T65HLF4	SOT-227
MSG100T65HLC6	TO-247-4L

### Electrical Characteristics (curves)

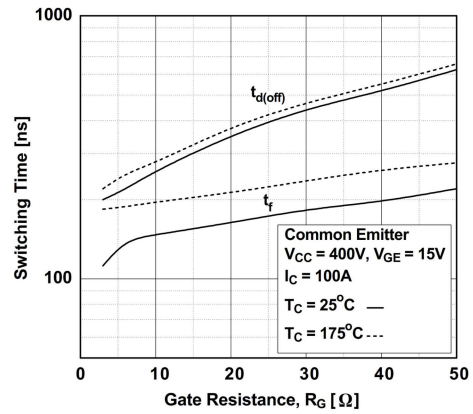




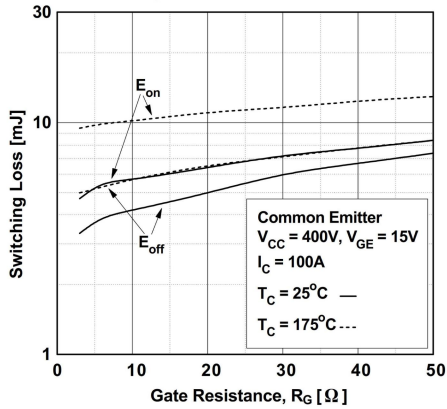
### Turn-on Characteristics vs. Gate Resistance



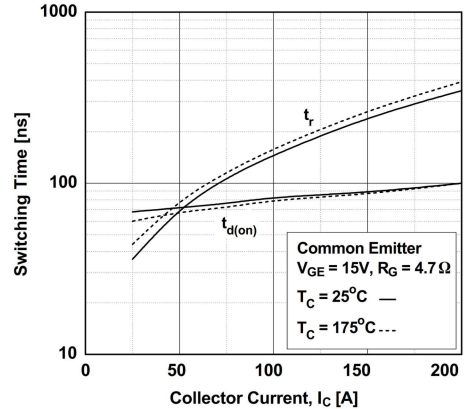
### Turn-off Characteristics vs. Gate Resistance



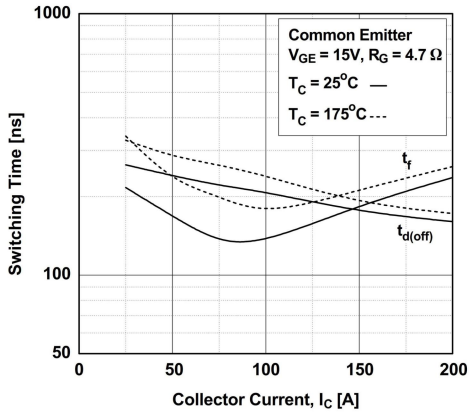
### Switching Loss vs. Gate Resistance



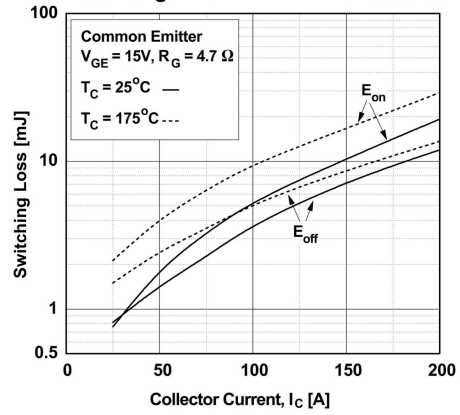
### Turn-on Characteristics vs. Collector Current



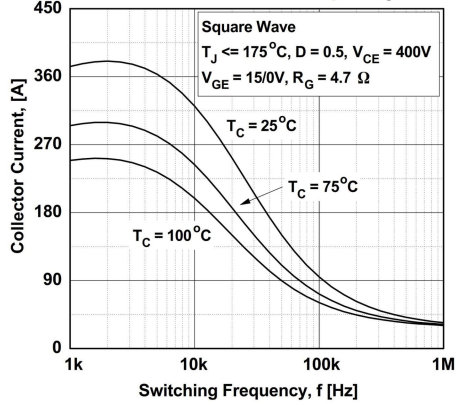
Turn-off Characteristics vs. Collector Current



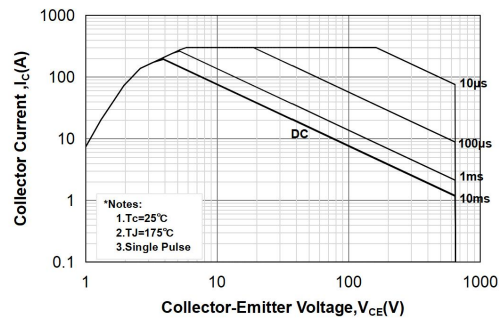
Switching Loss vs. Collector Current



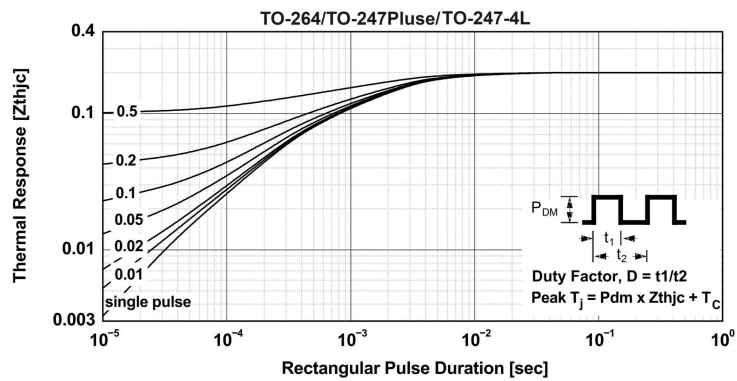
Load Current vs. Frequency



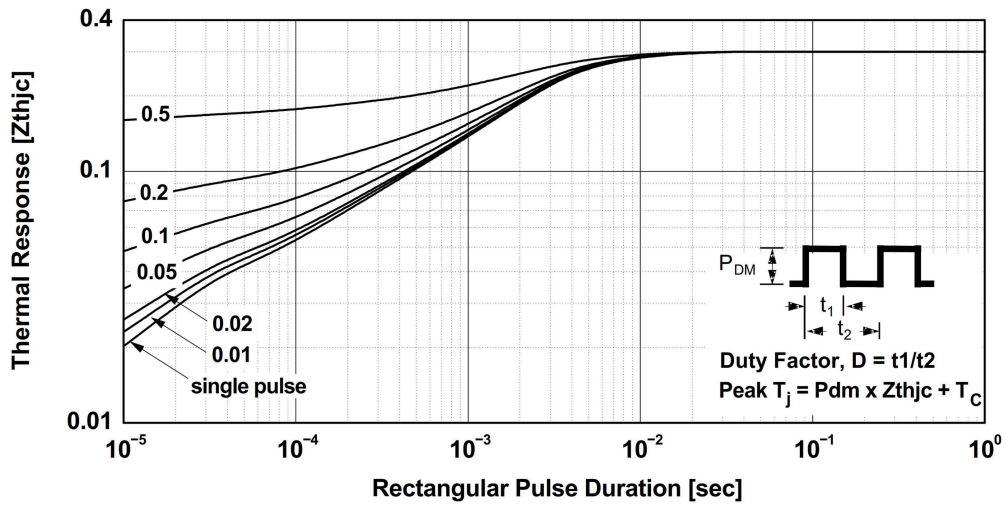
Forward Bias Safe Operating Area For TO-264/TO-247Plus/TO-247-4L



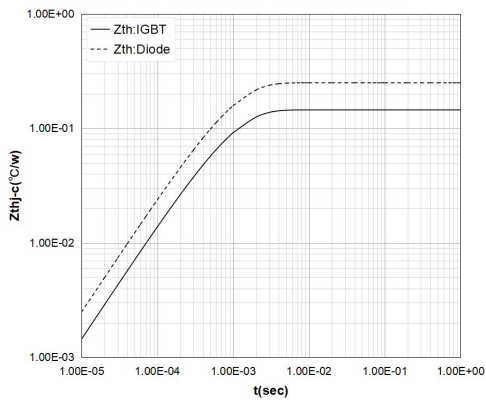
Transient Thermal Impedance of IGBT



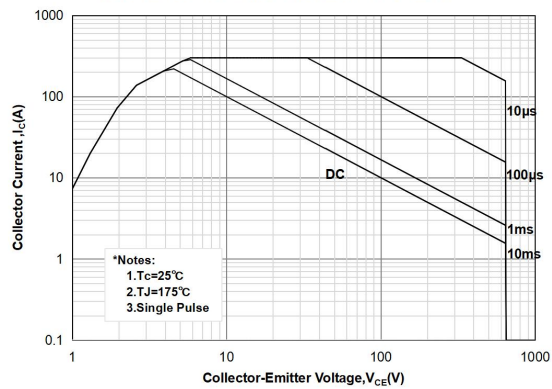
### Transient Thermal Impedance of Diode



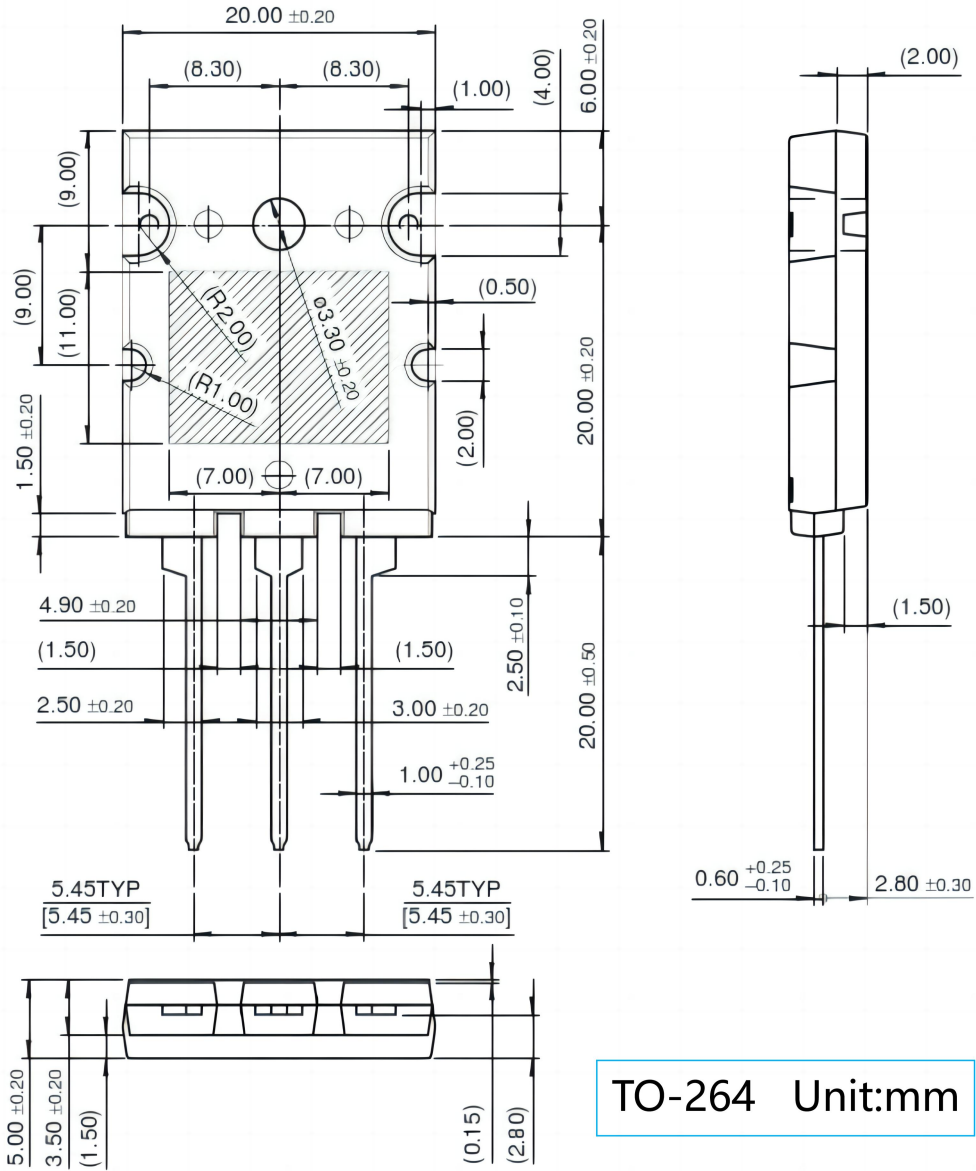
### Transient Thermal Impedance for SOT-227



### Forward Bias Safe Operating Area For SOT-227

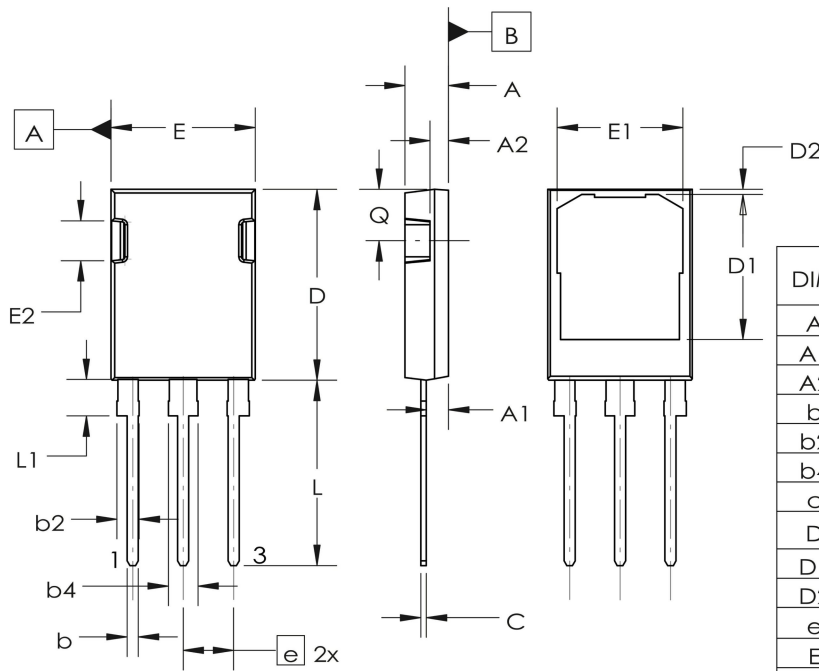


### Package Mechanical DATA



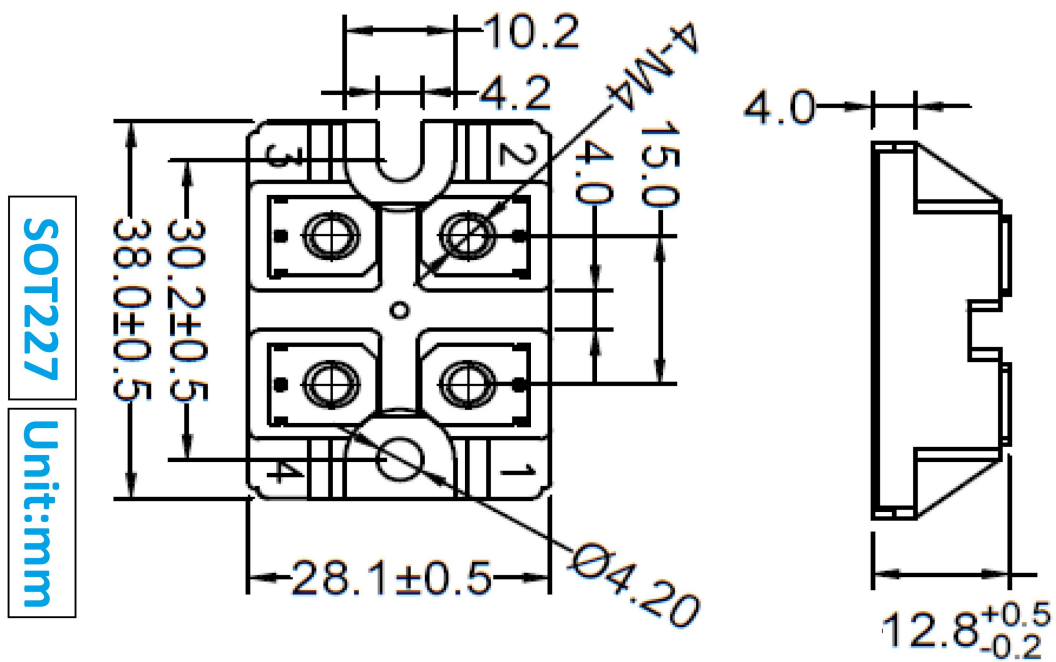
TO-264 Unit:mm



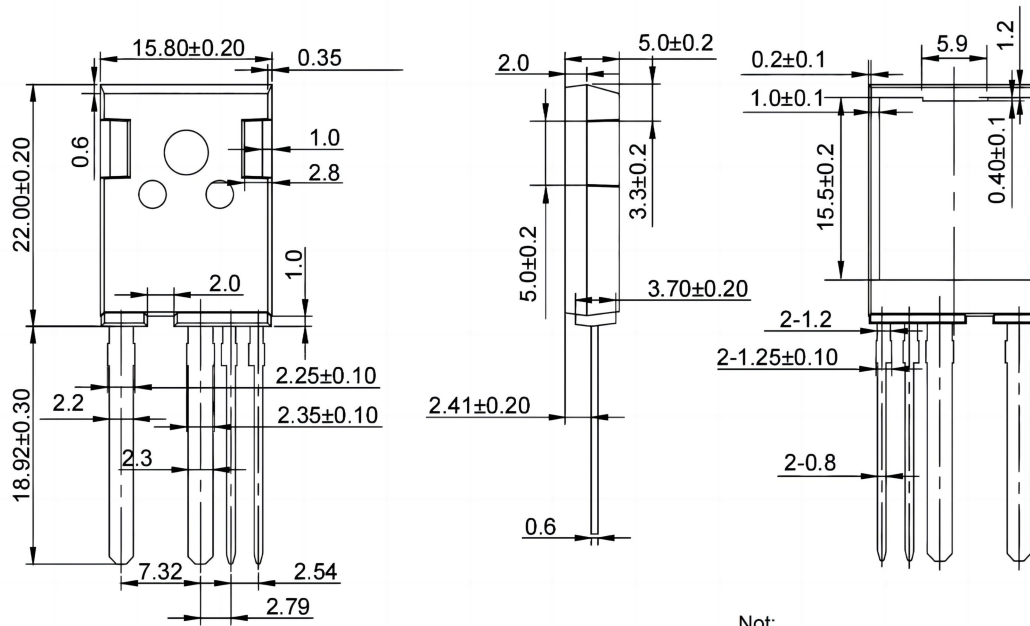


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.60	4.70	4.80
A1	2.10	2.40	2.70
A2	1.70	2.00	2.30
b	1.16	1.20	1.26
b2	2.20	2.40	2.60
b4	3.00	3.20	3.40
c	0.59	0.60	0.66
D	20.40	20.60	20.80
D1	15.47	15.67	15.87
D2	0.25	0.55	0.85
e	5.45 BSC		
E	15.40	15.60	15.80
E1	13.40	13.60	13.80
E2	4.12	4.30	4.52
L	19.70	20.00	20.30
L1	3.65	3.85	4.05
Q	5.35	5.55	5.75

**TO-247plus** Unit:mm



**SOT227**  
Unit:mm



Unit:mm

TO-247-4L

Not:  
 1. Unmarked tolerance  $\pm 0.15$   
 2. pitted surface Ra1.6-1.8