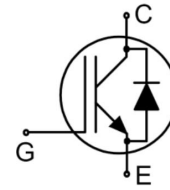
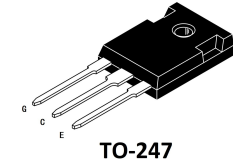
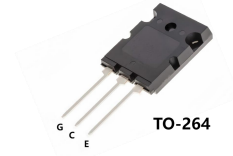


Features

- Very Low Saturation Voltage:
 $V_{CE(sat)(type)} = 1.26 \text{ V @ } I_C = 75 \text{ A}$
- Maximum Junction Temperature: $T_J = 150^\circ\text{C}$
- 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

Absolute Ratings ($T_c=25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol		Value	Unit
Collector-Emitter Voltage	V_{CES}		350	V
Gate-Emitter Voltage	V_{GES}		± 30	V
Collector Current-continuous	I_C	$T=25^\circ\text{C}$	240	A
		$T=100^\circ\text{C}$	120	A
Diode forward current	I_F	$T=25^\circ\text{C}$	120	A
		$T_c=100^\circ\text{C}$	60	A
Collector Current-pulse (note 1)	I_{CM}		480	A
Short Circuit Withstand Current (note 1)	I_{SC}		1440	A
Short Circuit Withstand Time (note 2)	t_{sc}		10	us
Power Dissipation(TO-264)	P_D	$T_c=25^\circ\text{C}$	694	W
		$T_c=100^\circ\text{C}$	277	W
Power Dissipation(TO-247)	P_D	$T_c=25^\circ\text{C}$	520	W
		$T_c=100^\circ\text{C}$	208	W
Operating and Storage Temperature Range	T_J, T_{STG}		-55~+150	$^\circ\text{C}$
Maximum Lead Temperature for Soldering Purposes	T_L		300	$^\circ\text{C}$

Electrical Characteristics ($T_C=25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Type	Max	Unit
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Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_C=1mA, V_{GE}=0V$	350	-	-	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=350V, V_{GE}=0V,$	-	-	40	μA
		$V_{CE}=350V, V_{GE}=0V,$ $T_C=125^{\circ}C$	-	-	1	mA
Gate-body leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 30V$	-	-	± 400	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	3.9	-	6.3	V
Collector-Emitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=75A$	-	1.26	-	V
		$V_{GE}=15V$ $I_C=75A, T_C=125^{\circ}C$	-	1.36	-	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=30V,$ $V_{GE}=0V,$ $f=1.0MHz$	-	3764	-	pF
Output capacitance	C_{oes}		-	295	-	pF
Reverse transfer capacitance	C_{res}		-	52	-	pF
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=200V, I_C=120A,$ $R_G=5\Omega, V_{GE}=15V,$ Inductive Load $T_C=25^{\circ}C$	-	35	-	ns
Turn-On rise time	t_r		-	134	-	ns
Turn-Off delay time	$t_{d(off)}$		-	102	-	ns
Turn-Off Fall time	t_f		-	115	-	ns
Turn-on Loss	E_{on}		-	6.8	-	mJ
Turn-off Loss	E_{off}		-	3.5	-	mJ
Total Loss	E_{ts}		-	10.3	-	mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=200V, I_C=120A,$ $R_G=5\Omega, V_{GE}=15V,$ Inductive Load $T_C=175^{\circ}C$	-	33	-	ns
Turn-On rise time	t_r		-	130	-	ns
Turn-Off delay time	$t_{d(off)}$		-	106	-	ns
Turn-Off Fall time	t_f		-	130	-	ns
Turn-on switching Loss	E_{on}		-	10.2	-	mJ
Turn-off switching Loss	E_{off}		-	10.5	-	mJ
Total switching Loss	E_{ts}		-	20.7	-	mJ
Gate Charge	Q_g	$V_{CC}=200V, I_C=60A$ $V_{GE}=15V$	-	185	-	nC
Gate to Emitter Charge	Q_{ge}		-	29	-	nC
Gate to Collector	Q_{gc}		-	78	-	nC

Charge						
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V_F	$I_F=30A$	-	0.95	1.2	V
Diode Reverse Recovery Time	t_{rr}	$I_F=30A$ $-dI_F/dt=100A/us$ $T_J=25^{\circ}C$	-	33	-	ns
Diode Peak Reverse Recovery Current	I_{rr}		-	8	-	A
Diode Reverse recovery charge	Q_{rr}		-	50	-	nC
Diode Reverse recovery time	t_{rr}	$I_F=30A$ $dI_F/dt=100A/us$ $T_J=125^{\circ}C$	-	40	-	ns
Diode Peak Reverse Recovery Current	I_{rr}		-	10	-	A
Diode Reverse recovery charge	Q_{rr}		-	63	-	nC

Thermal Characteristics

Parameter	Symbol	Value		Unit
		TO-264	TO-247	
Thermal Resistance,Junction to Case (IGBT),Max	$R_{th(j-c)}$	0.18	0.24	$^{\circ}C/W$
Thermal Resistance,Junction to Case (Diode),Max	$R_{th(j-c)}$	0.32	0.34	$^{\circ}C/W$
Thermal Resistance,Junction to Ambient,Max	$R_{th(j-A)}$	40	45	$^{\circ}C/W$

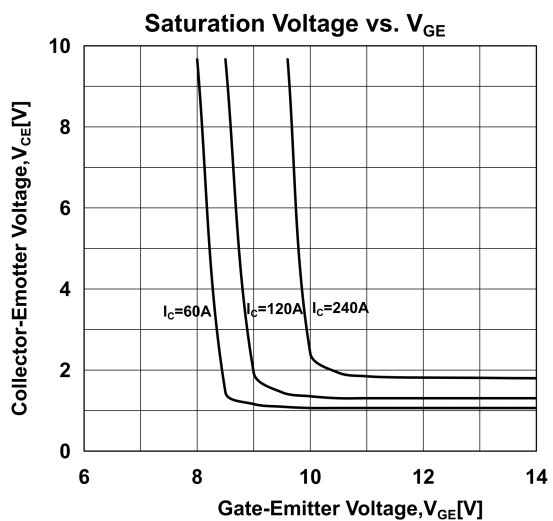
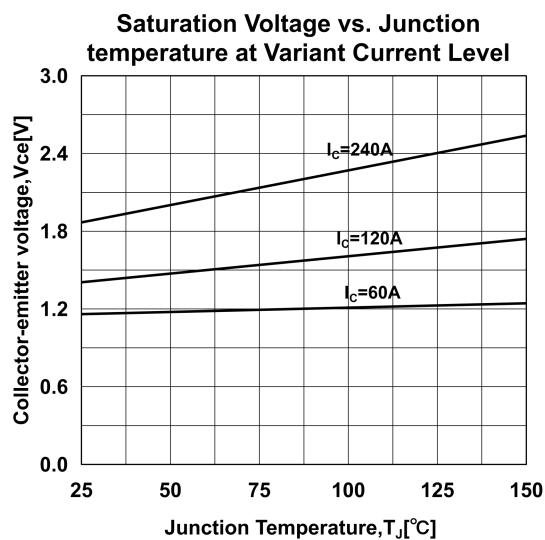
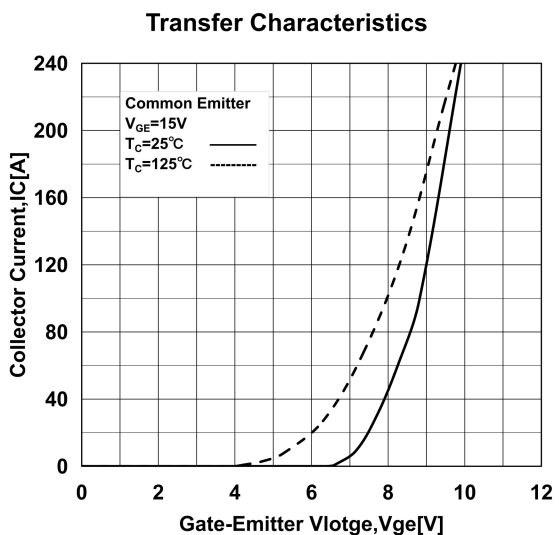
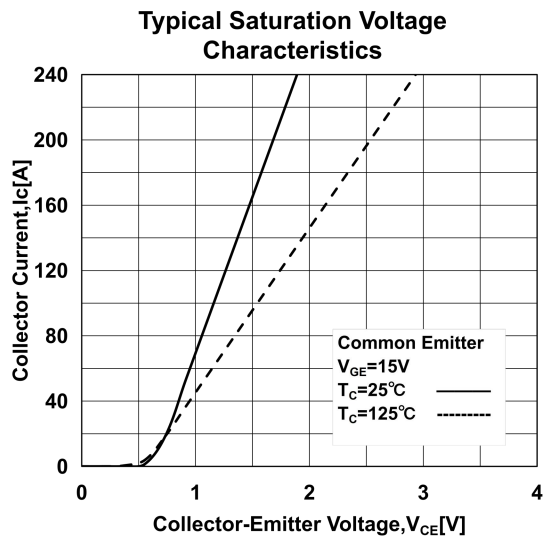
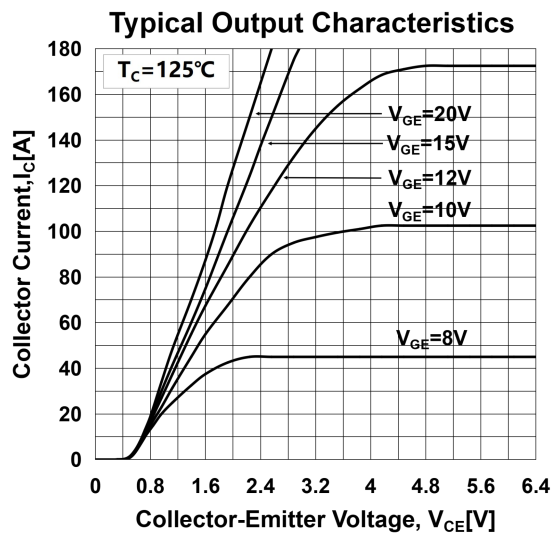
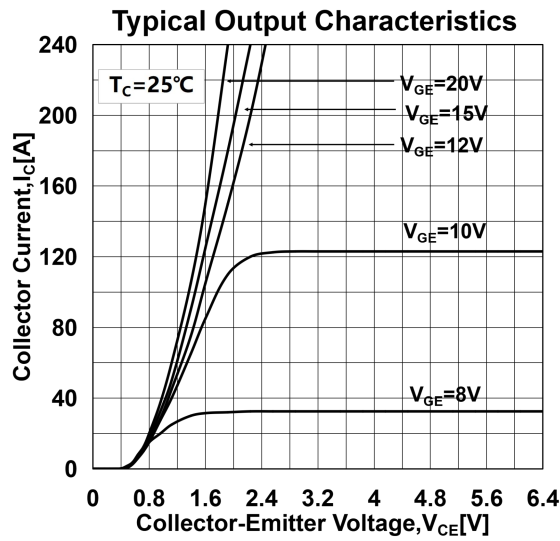
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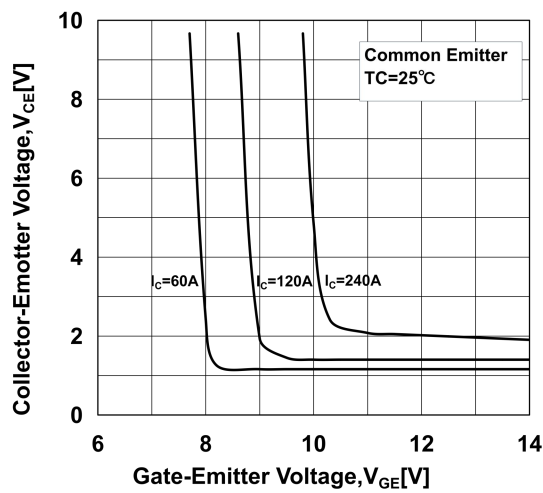
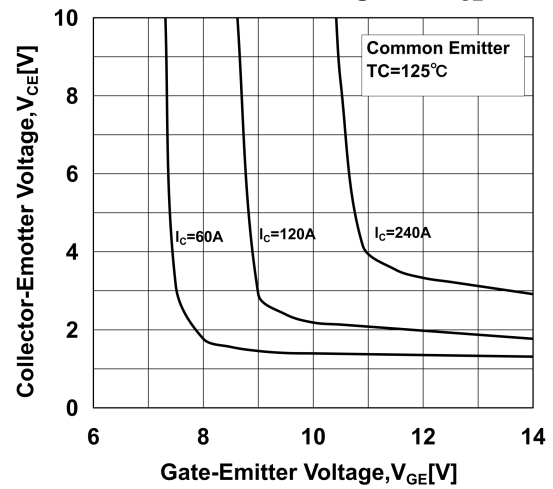
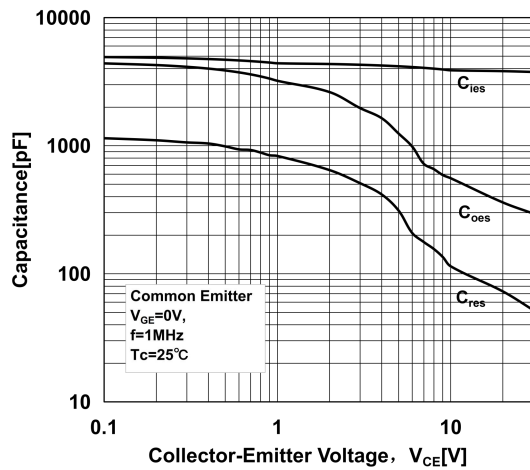
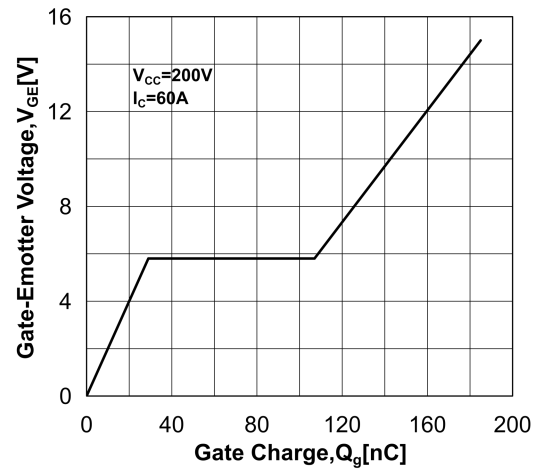
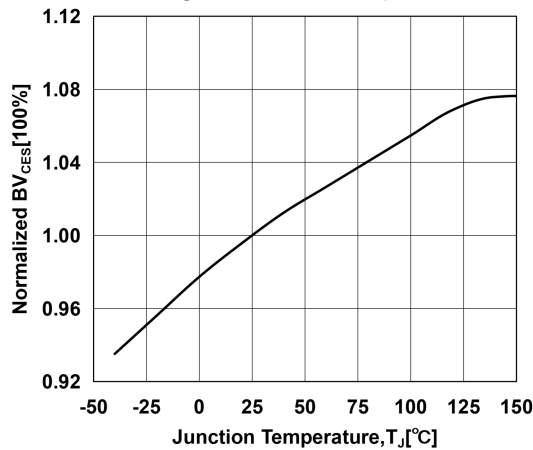
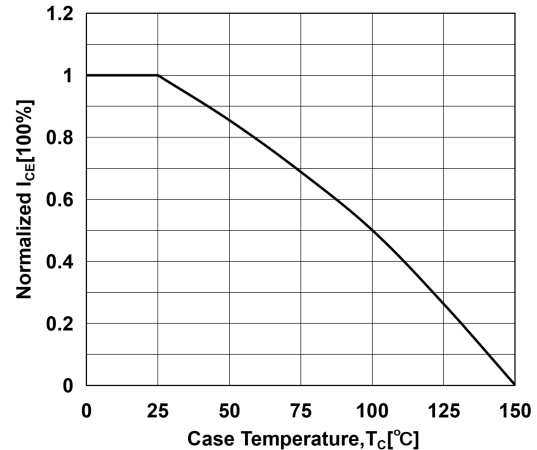
1. Repetitive Rating: Pulse width limited by maximum junction temperature

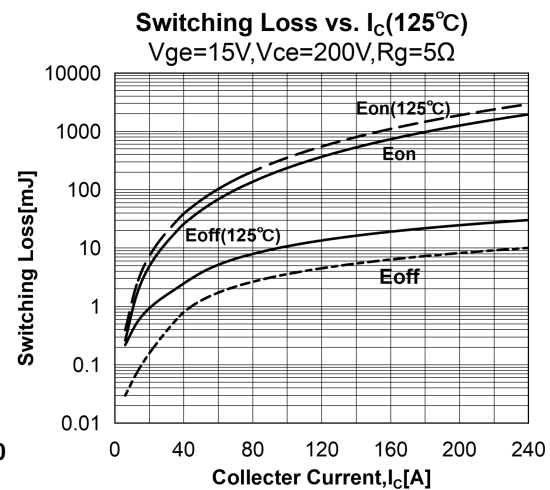
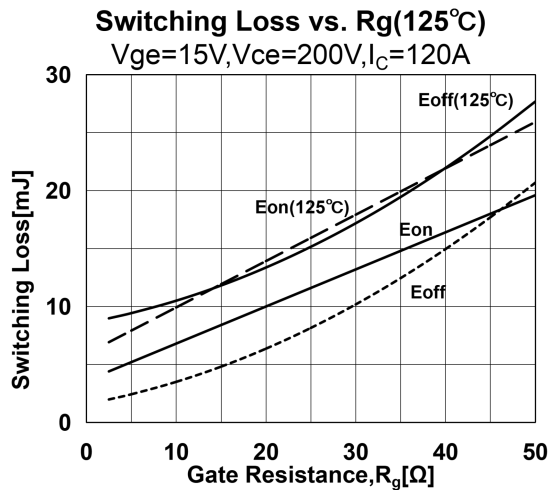
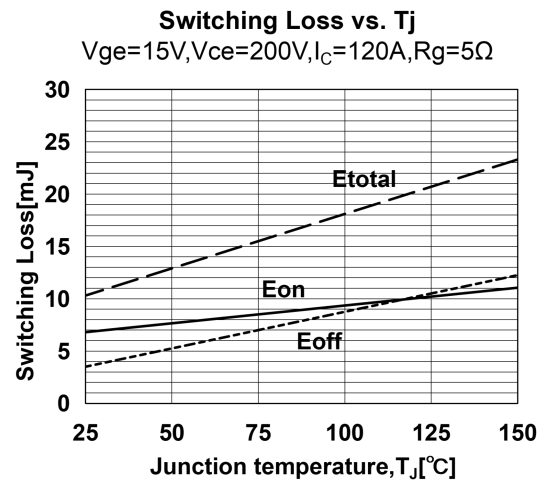
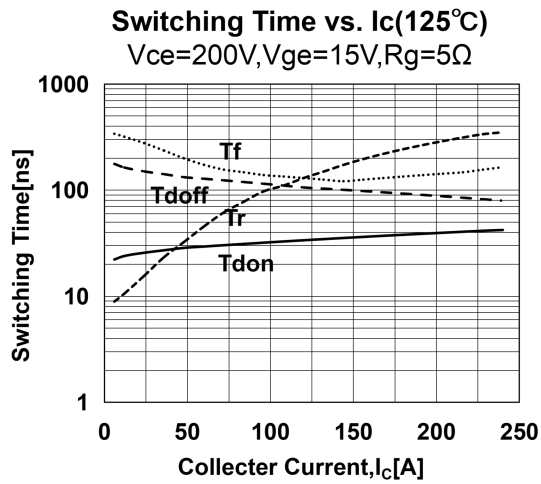
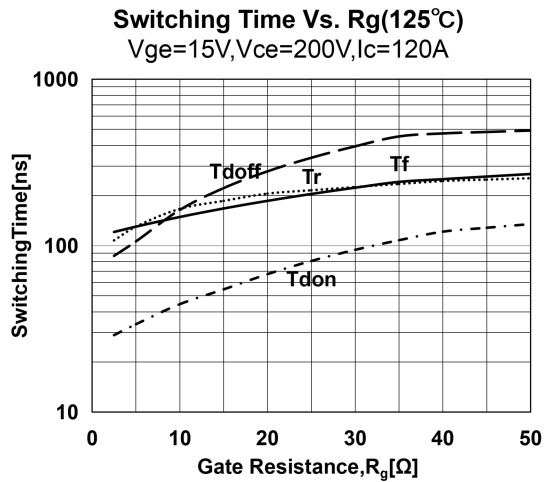
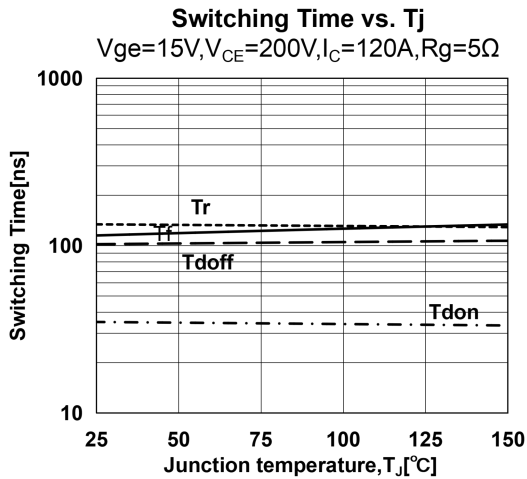
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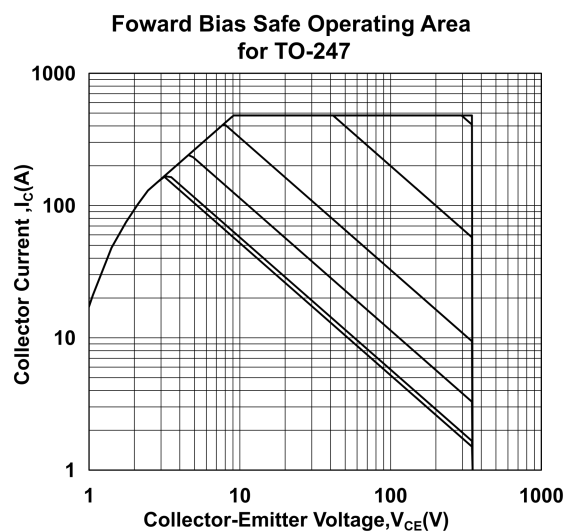
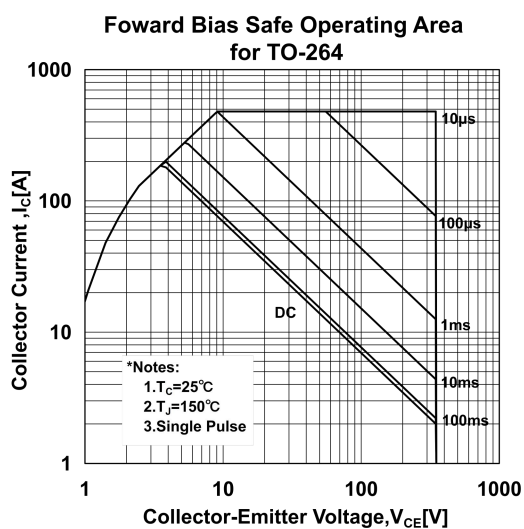
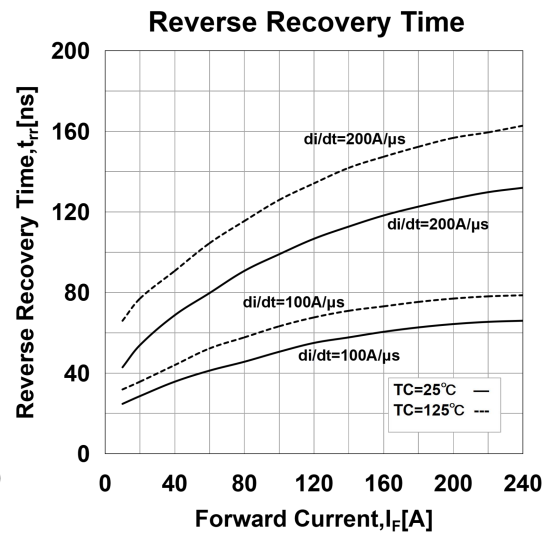
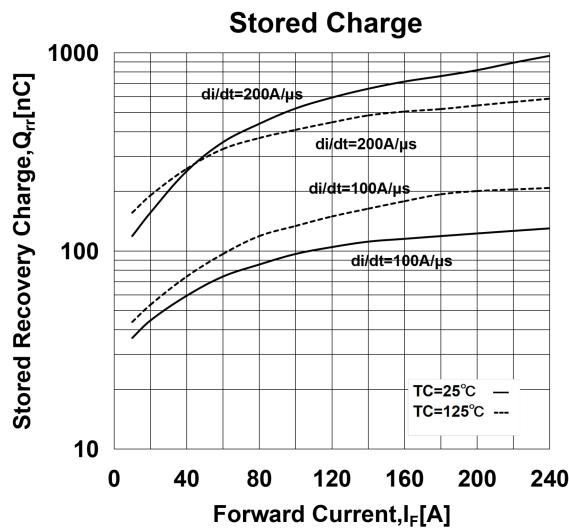
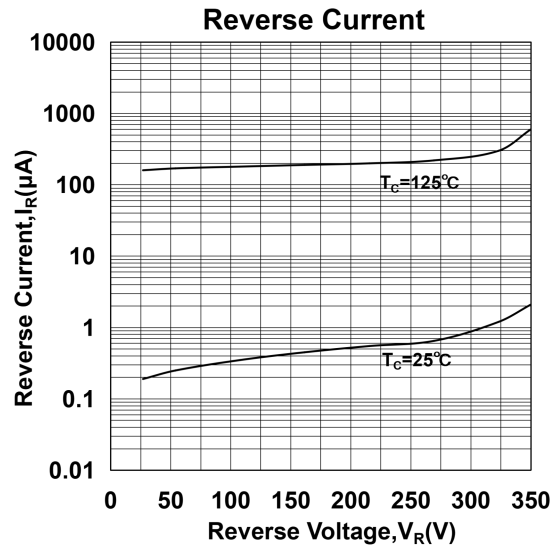
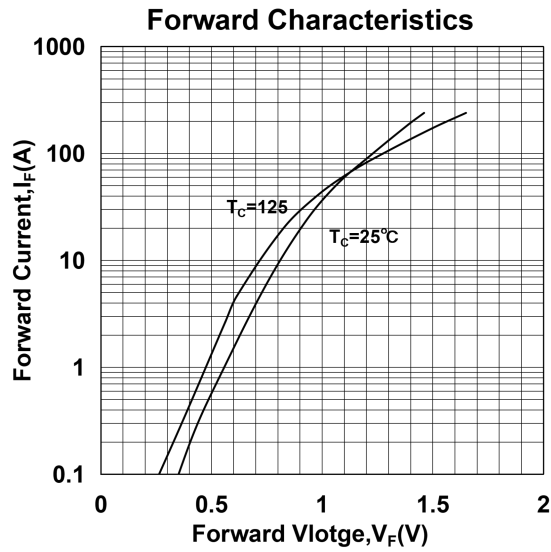
Making	Package
MSG120N35HLB3	TO-264
MSG120N35HLC0	TO-247

Electrical Characteristics(curves)

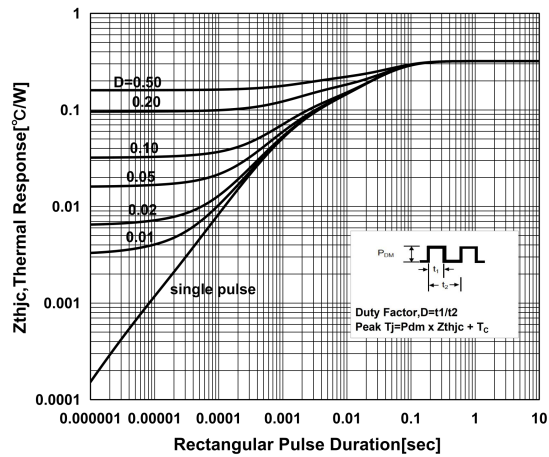


Saturation Voltage vs. V_{GE}

Saturation Voltage vs. V_{GE}

Capacitance Characteristics

Gate Charge Characteristics

Normalized Collector to Emitter Breakdown Voltage vs. Junction Temperature

Normalized Collector-Emmitter Current Standard Derating Curve


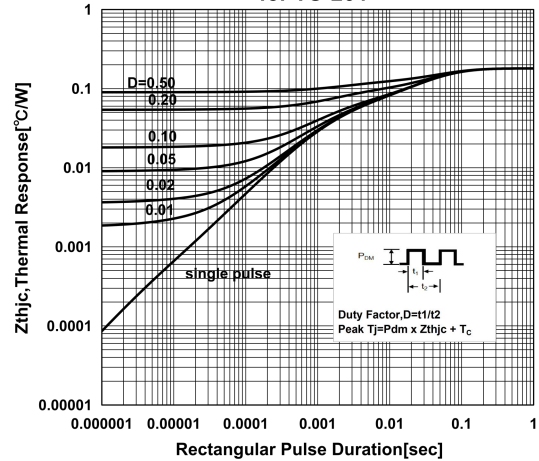




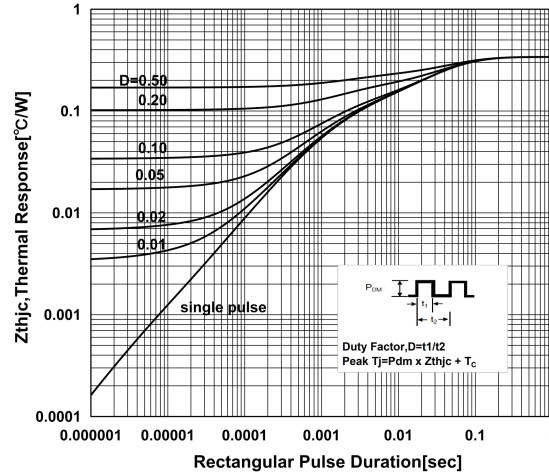
Transient Thermal Impedance of Diode
for TO-264



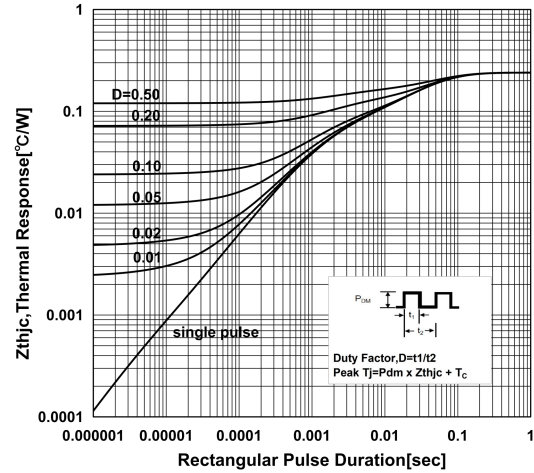
Transient Thermal Impedance for IGBT
for TO-264



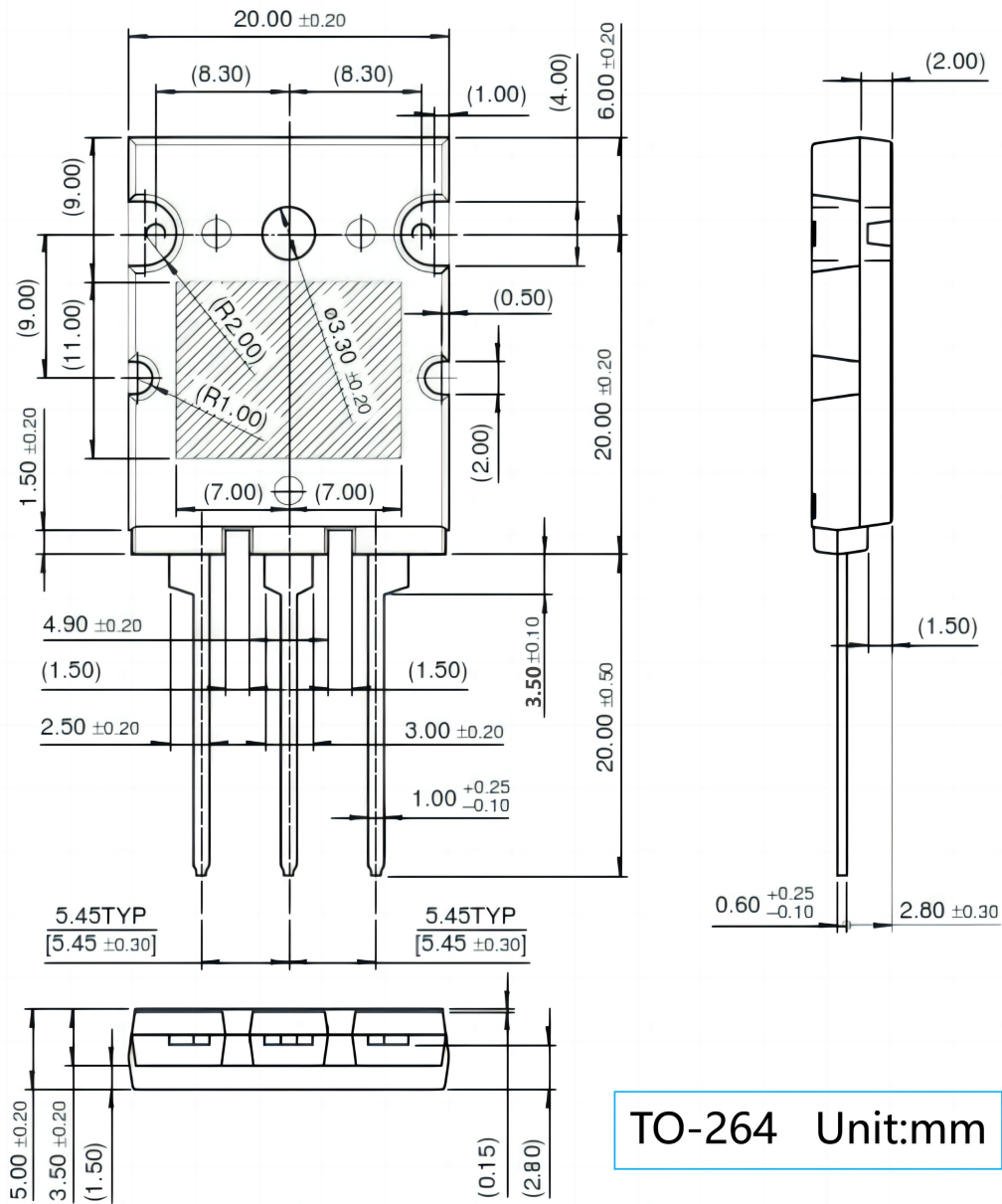
Transient Thermal Impedance of Diode
for TO-247



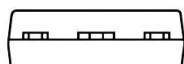
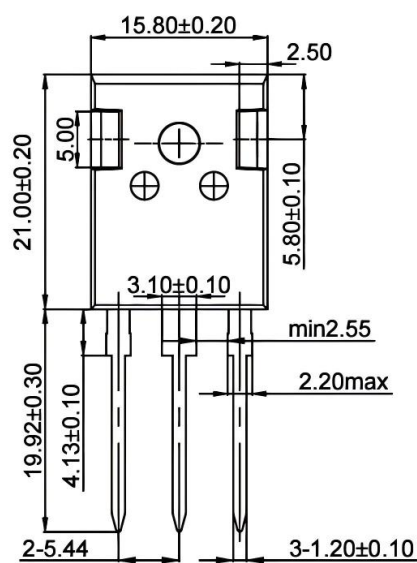
Transient Thermal Impedance of IGBT
for TO-247



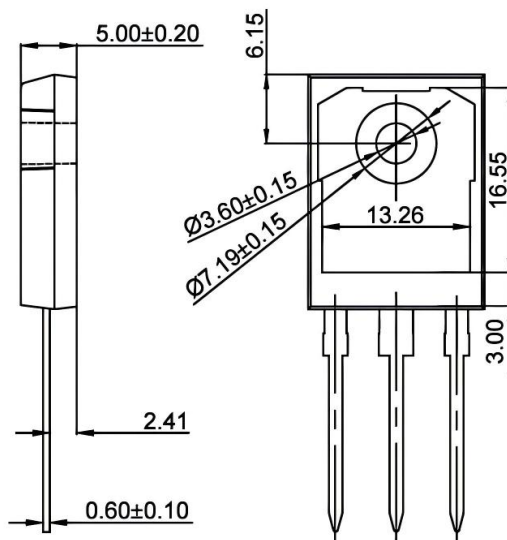
Package Mechanical DATA



TO-264 Unit:mm



NOTES: 1. surface roughness $Ra = 1.14 \pm 0.20 \mu m$
 2. Unmarked tolerance ± 0.15
 3. unit: mm



TO-247