

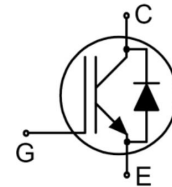
Features

- Very Low Saturation Voltage:
 $V_{CE(sat)(type)} = 1.8\text{ V @ } I_C = 100\text{ A}$
- Maximum Junction Temperature: $T_J = 175^\circ\text{C}$
- 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($T_c=25^\circ\text{C}$)

Parameter	Symbol		Value	Unit
Collector-Emitter Voltage	V _{ces}		650	V
Collector Current-continuous	I _C	T=25℃	240	A
		T=100℃	120	A
Diode forward current	I _F	T=25℃	100	A
		Tc=100℃	50	A
Collector Current-pulse (note 1)	I _{CM}		378	A
Gate-Emitter Voltage	V _{GES}		±30	V
Power Dissipation	P _D	Tc=25℃	882	W
		Tc=100℃	441	W
Operating and Storage Temperature Range	T _J ,T _{STG}		-55~+175	℃
Short Circuit Withstand Time	t _{sc}		5	us
Maximum Lead Temperature for Soldering Purposes	T _L		300	℃
Isolation Voltage for Case to Terminal	V _{ISO}		3.0	KV

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_C=1\text{mA}, V_{GE}=0\text{V}$	650	-	-	V

Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_C=25^{\circ}C$	-	-	40	μA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=30V$	-	-	250	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-30V$	-	-	-250	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	3.9	4.9	5.9	V
Collector-Emitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=100A$	-	1.8	2.3	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1.0MHz$	-	5764	-	pF
Output capacitance	C_{oes}		-	495	-	pF
Reverse transfer capacitance	C_{res}		-	115	-	pF

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_C=120A, R_G=5\Omega, V_{GE}=15V, \text{ Inductive Load } T_C=25^{\circ}C$	-	53	-	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	$t_{d(on)}$	$V_{CC}=400V, I_C=120A, R_G=5\Omega, V_{GE}=15V, \text{ Inductive Load } T_C=175^{\circ}C$	-	50	-	ns
Turn-On rise time	t_r		-	133	-	ns
Turn-Off delay time	$t_{d(off)}$		-	109	-	ns
Turn-Off Fall time	t_f		-	138	-	ns
Turn-on switching Loss	E_{on}		-	9.8	-	mJ
Turn-off switching Loss	E_{off}		-	4.0	-	mJ
Total switching Loss	E_{ts}		-	13.8	-	mJ
Gate Charge	Q_g		-	181	-	nC

Gate to Emitter Charge	Q _{ge}	V _{CC} =400V,I _c =120A V _{GE} =15V	-	49	-	nC
Gate to Collector Charge	Q _{gc}		-	74	-	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _F	I _F =30A	-	1.36	1.8	V
Diode Reverse recovery time	t _{rr}	I _F =30A di _F =/dt=200A/us T _J =25℃	-	123	-	ns
Diode Reverse recovery charge	Q _{rr}		-	2.8	-	μC

Thermal Characteristic

Parameter	Symbol	Max	Unit
Thermal Resistance, Junction to Case (IGBT)	$R_{th(j-c)}$	0.17	$^{\circ}C/W$
Thermal Resistance, Junction to Case (Diode)	$R_{th(j-c)}$	0.32	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	$^{\circ}C/W$

Notes:

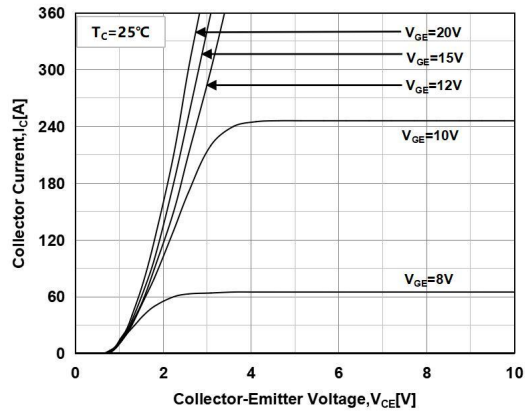
1. Repetitive Rating: Pulse width limited by maximum junction temperature

Order Information

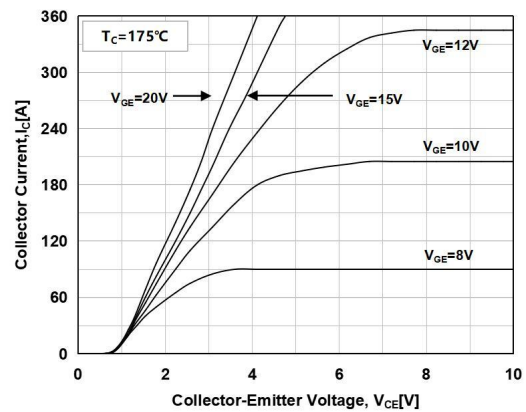
Making	Package
MSG120T65HLB3	TO-264

Electrical Characteristics(curves)

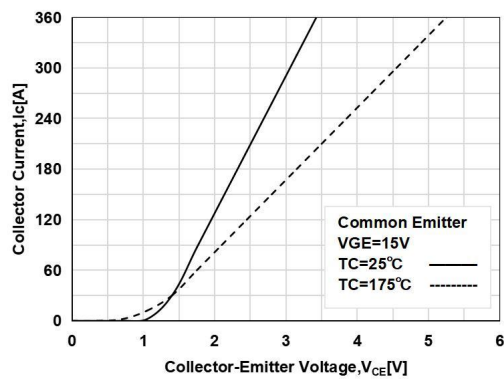
Typical Output Characteristics



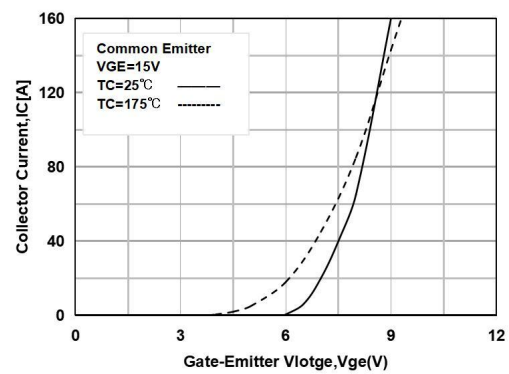
Typical Output Characteristics



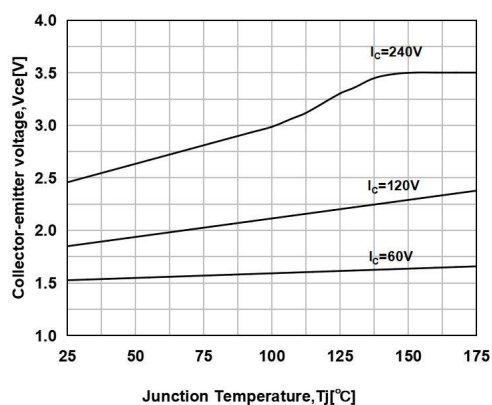
Typical Saturation Voltage Characteristics



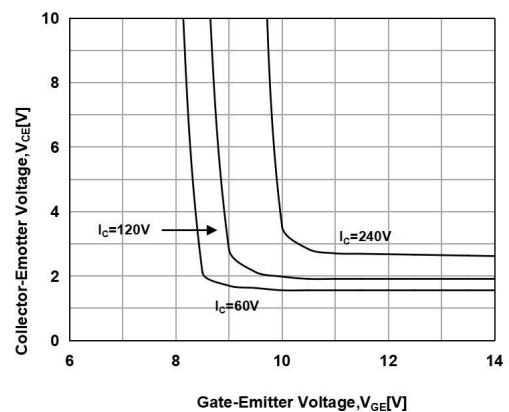
Transfer Characteristics



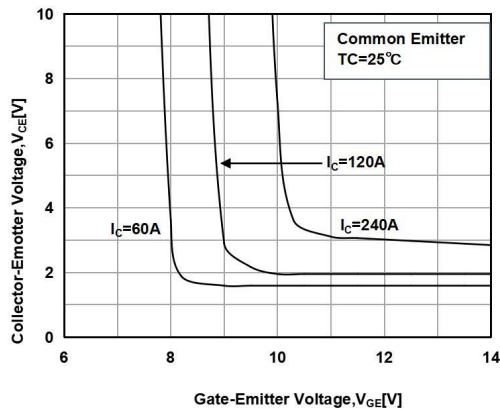
Saturation Voltage vs. Junction temperature at Variant Current Level



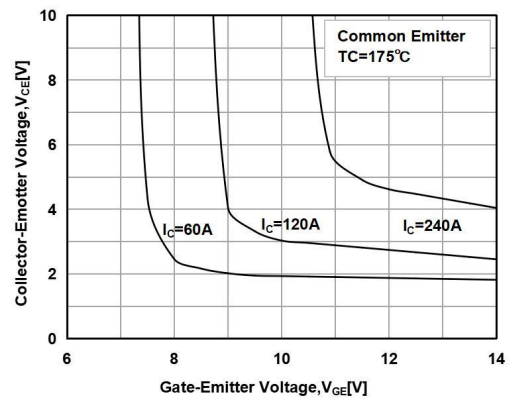
Saturation Voltage vs. V_{ge}



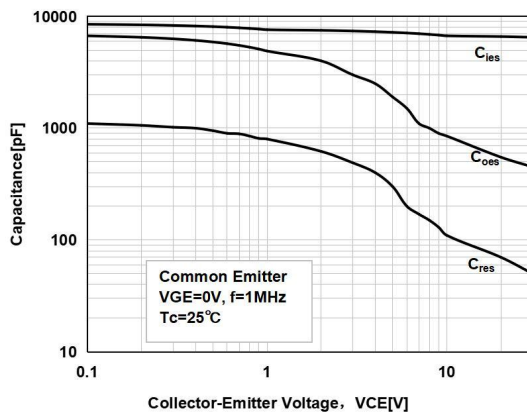
Saturation Voltage vs. V_{GE}



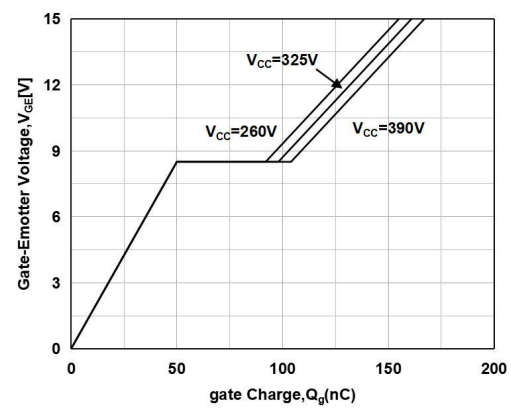
Saturation Voltage vs. V_{GE}



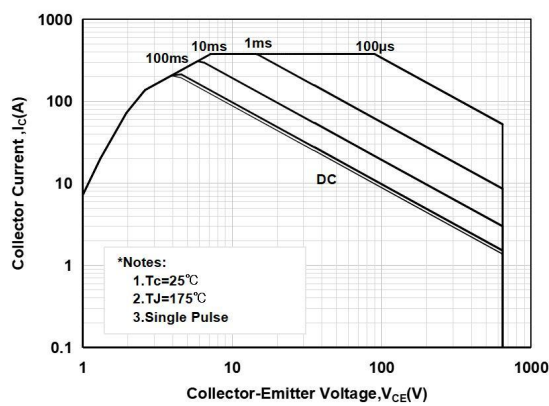
Capacitance Characteristics



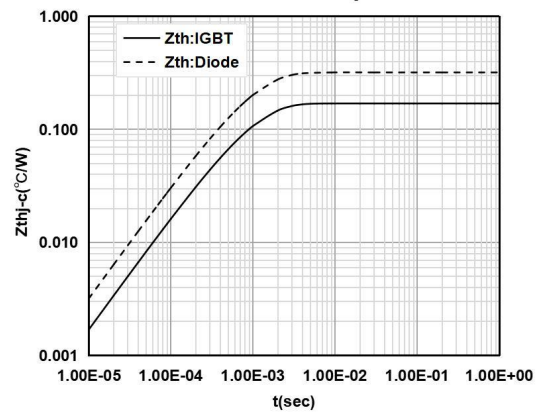
Gate Charge Characteristics

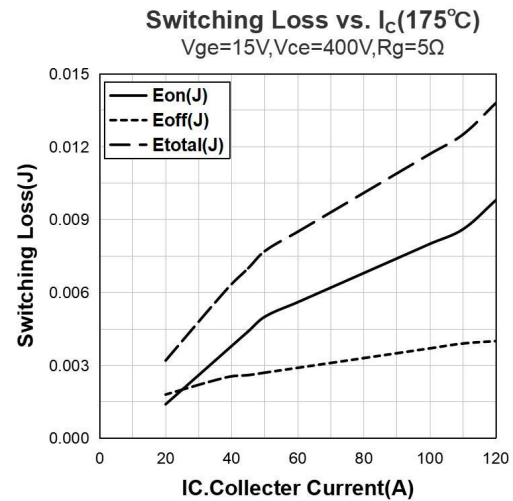
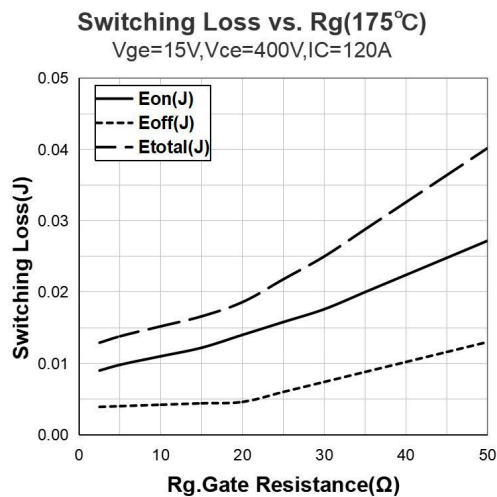
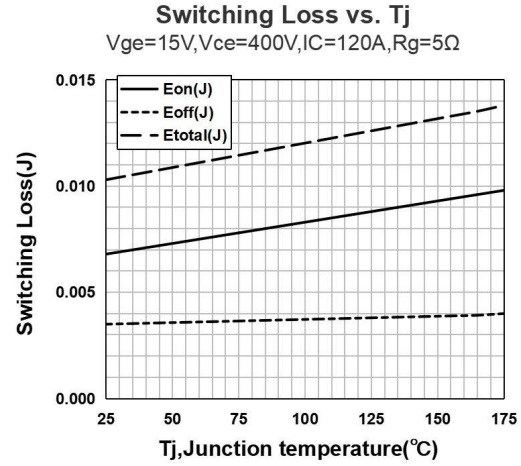
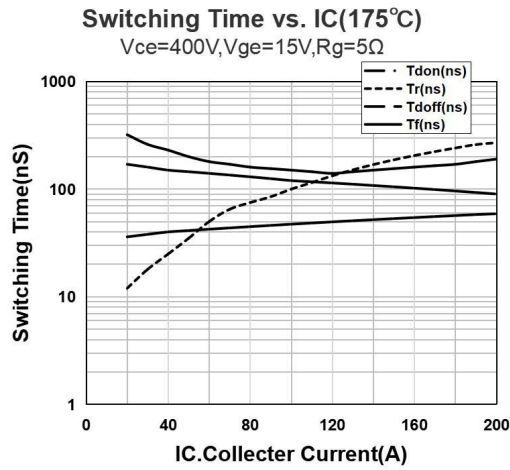
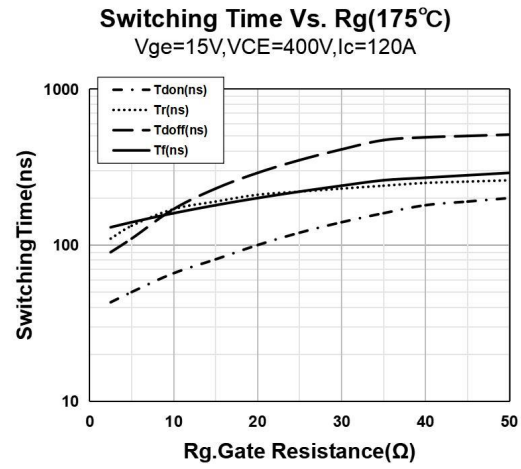
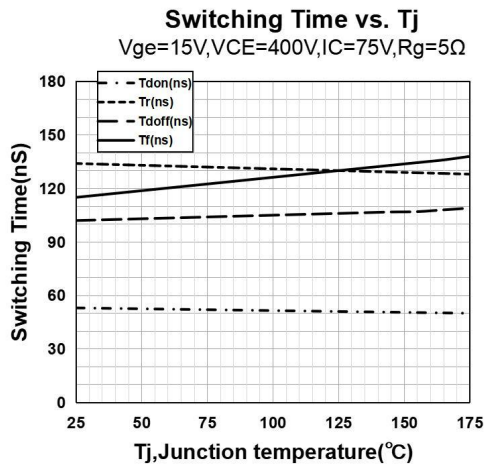


Foward Bias Safe Operating Area

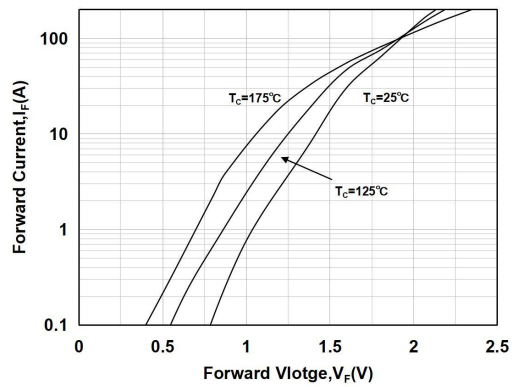


Transient Thermal Impedance

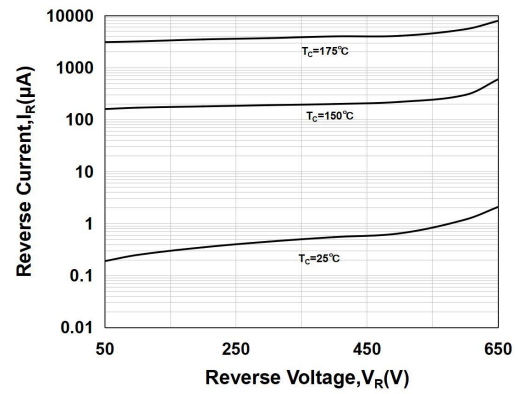




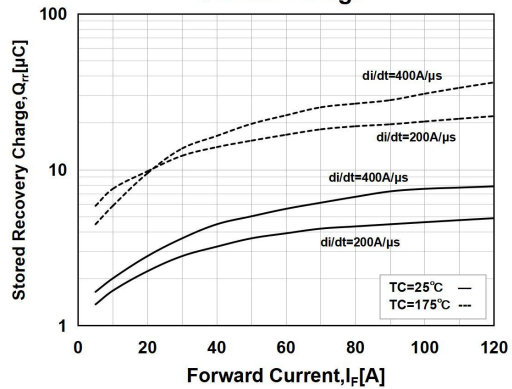
Forward Characteristics



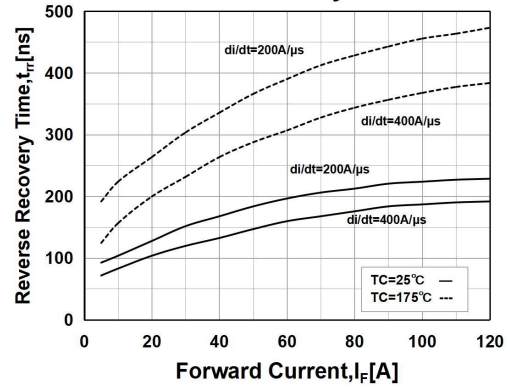
Reverse Current



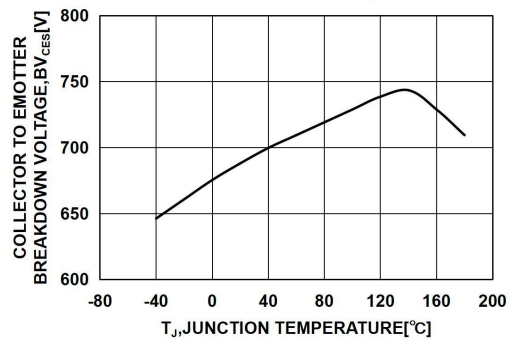
Stored Charge

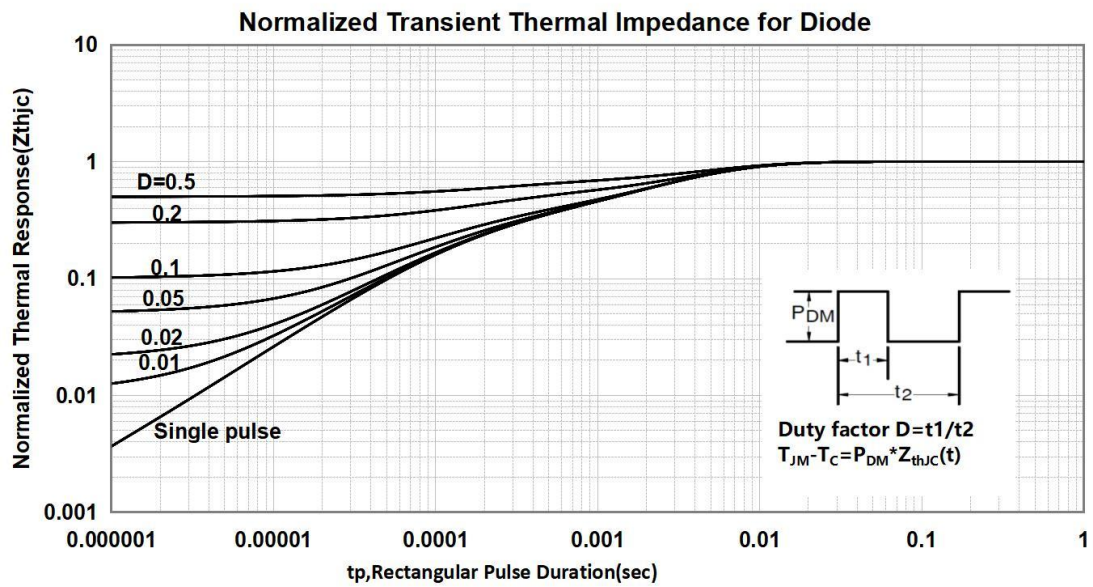
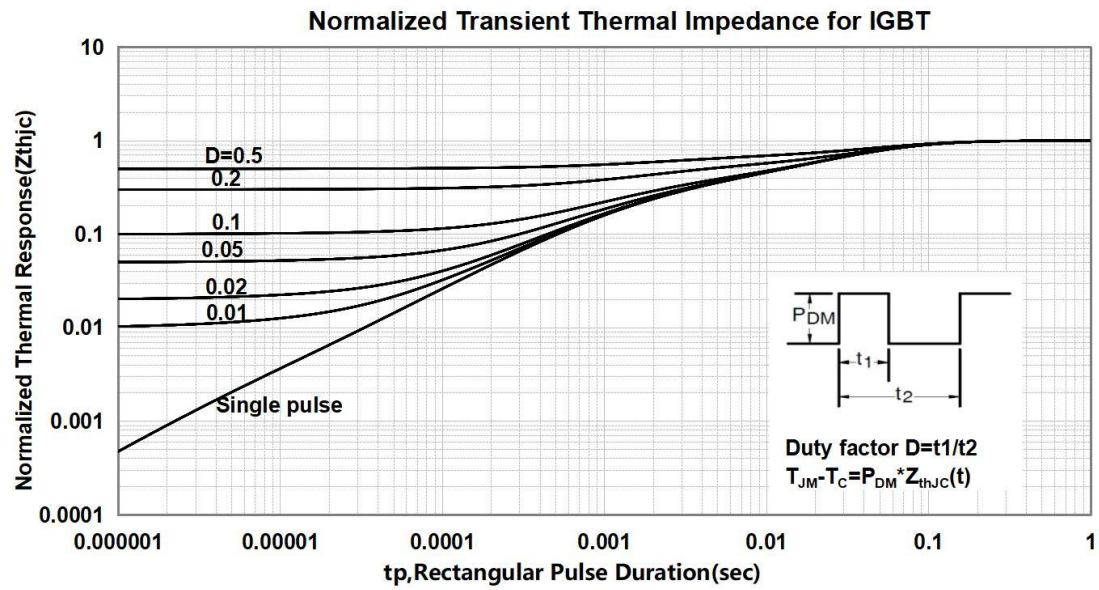


Reverse Recovery Time



Collector to Emitter Breakdown Voltage vs. Junction Temperature





Package Mechanical DATA

