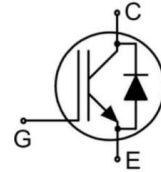


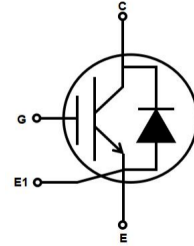
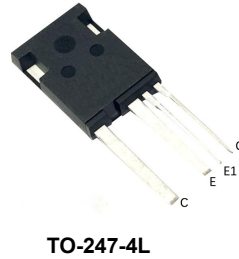
Features

- Very Low Saturation Voltage
 $V_{CE(sat)} = 1.35V @ I_C = 100A$
- Maximum Junction Temperature: $T_J = 175^\circ C$
- Positive Temperature Coefficient
- Tight Parameter Distribution
- High Input Impedance



Applications

- Main Inverter
- Climate Compressor
- DC/AC Converter
- Motor Drives



Absolute Ratings($T_c=25^\circ C$)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{ce}	650	V
Collector Current-continuous	$I_C, T=25^\circ C$ $T=100^\circ C$	400	A
		200	A
Diode forward current	$I_F, T=25^\circ C$ $T_c=100^\circ C$	400	A
		200	A
Collector Current-pulse	I_{CM}	600	A
Gate-Emitter Voltage	V_{GES}	± 20	V
PowerDissipation (TO-264)	PD $T_c=25^\circ C$ $T_c=100^\circ C$	1000	W
		500	
PowerDissipation (TO-247-4L)	PD $T_c=25^\circ C$ $T_c=100^\circ C$	625	W
		363	
Operating Temperature Range	T_J	$-40 \sim +175$	$^\circ C$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^\circ C$
Short Circuit Withstand Time	t_{sc}	10	μs
Maximum Lead Temperature for Soldering Purposes	T_L	260	$^\circ C$
Isolation Voltage for Case-Terminal	V_{ISO}	3.0	KV

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	650	-	-	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_C=25^\circ C$	-	-	100	μA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V$	-	-	300	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-300	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=600\mu A$	3.5	4.9	6.5	V
Collector-Emitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=100A$	-	1.35	1.60	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$	-	6770	-	pF
Output capacitance	C_{oes}		-	581	-	pF
Reverse transfer capacitance	C_{res}		-	66	-	pF
Transconductance	g_{fs}	$I_C=200A, V_{CE}=20V$ (Note 3)	-	85	-	S
Short-circuit collector current	I_{sc}	$V_{CC} \leq 400V, V_{GE} = 15V, t_{sc} \leq 10\mu s$ (Note 4)	-	950	-	A

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_C=200A, R_G=15\Omega, V_{GE}=15V, \text{Inductive Load}$ $T_C=25^\circ C$	-	156	-	ns
Turn-On rise time	t_r		-	237	-	ns
Turn-Off delay time	$t_{d(off)}$		-	454	-	ns
Turn-Off Fall time	t_f		-	120	-	ns
Turn-on Loss	E_{on}		-	15.4	-	mJ
Turn-off Loss	E_{off}		-	10.0	-	mJ
Total Loss	E_{ts}		-	25.4	-	mJ
Gate Charge	Q_g		-	230	-	nC

Gate to Emitter Charge	Q _{ge}	V _{CC} =520V, I _c =200A V _{GE} = 15V	-	65	-	nC
Gate to Collector Charge	Q _{gc}		-	104	-	nC

Anti-Parallel Diode Characteristics and Maximum Ratings

Drain-Source Diode Forward Voltage	V _F	I _F =60A(T _J =25°C)	-	1.35	-	V
Diode Reverse recovery time	t _{rr}	I _F =200A dI _F /dt=500A/us T _J =25°C	-	160	-	ns
Diode Reverse recovery charge	Q _{rr}		-	0.85	-	μC

Thermal Characteristics

Parameter	Symbol	Value		Unit
		TO-264	TO-247-4L	
Thermal Resistance, Junction to Case (IGBT), Max	R _{th(j-c)}	0.15	0.24	°C/W
Thermal Resistance, Junction to Case (Diode), Max	R _{th(j-c)}	0.41	0.34	°C/W
Thermal Resistance, Junction to Ambient, Max	R _{th(j-A)}	40	45	°C/W

Ordering information

Order codes	Marking	Package
MSG200T65HLB3	MSG200T65HLB3	TO-264
MSG200T65HLC6	MSG200T65HLC6	TO-247-4L

Electrical Characteristics(curves)

Fig. 1 Output characteristic V_{CE} vs. I_C at 25°C

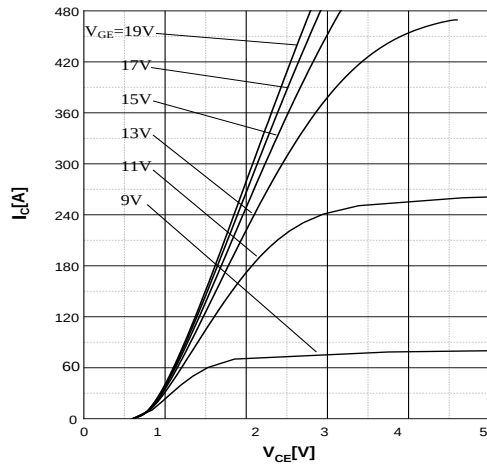


Fig. 2 Output characteristic V_{CE} vs. I_C at 175°C

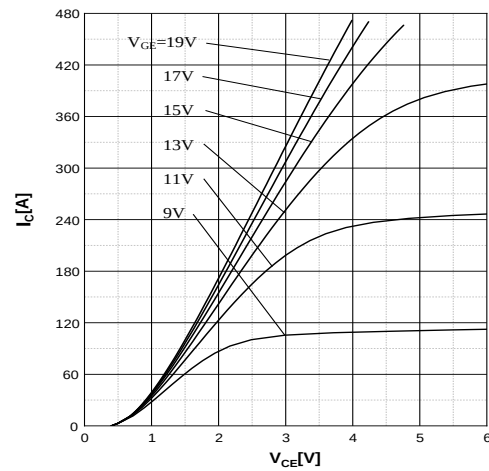


Fig. 3 Transfer characteristic V_{GE} vs. I_C

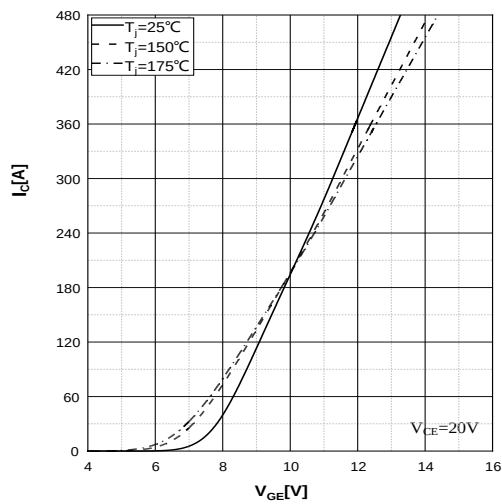


Fig. 4 Collector-emitter saturation voltage as a function of junction temperature $V_{CE sat}$ vs. T_j

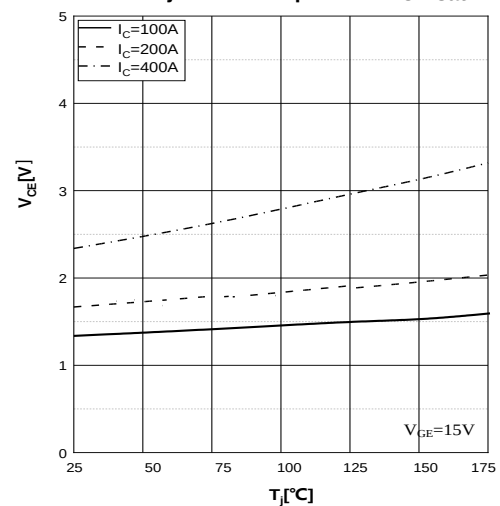


Fig. 5 Gate-emitter threshold voltage as a function of junction temperature $V_{GE(th)}$ vs. T_j

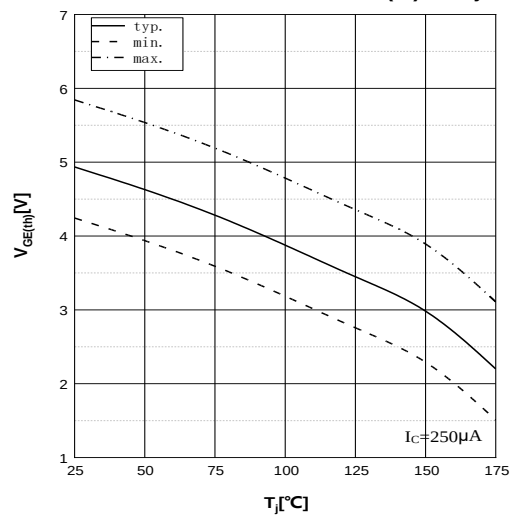


Fig. 6 Gate charge Q_g

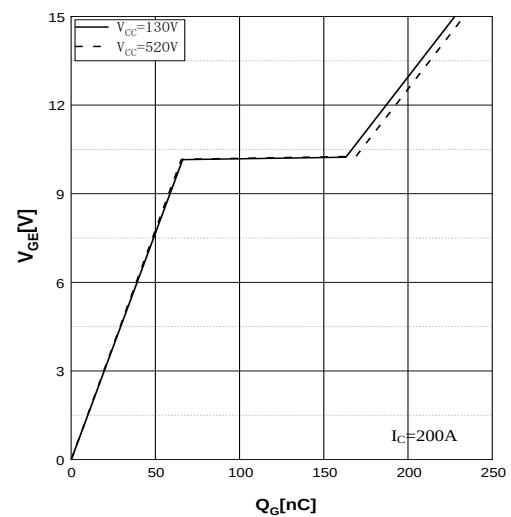


Fig. 7 Capacitance characteristic

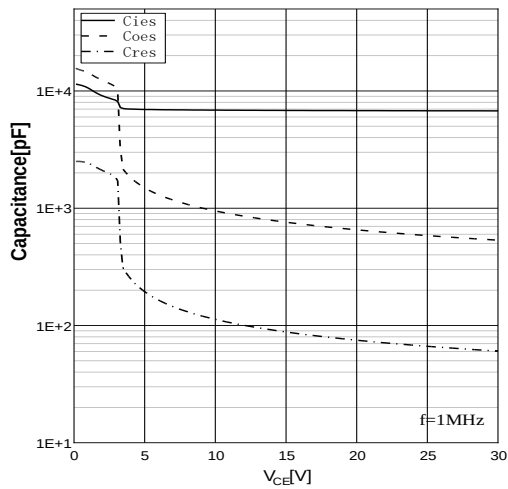


Fig. 8 Diode forward current as a function of forward voltage V_F vs. I_F

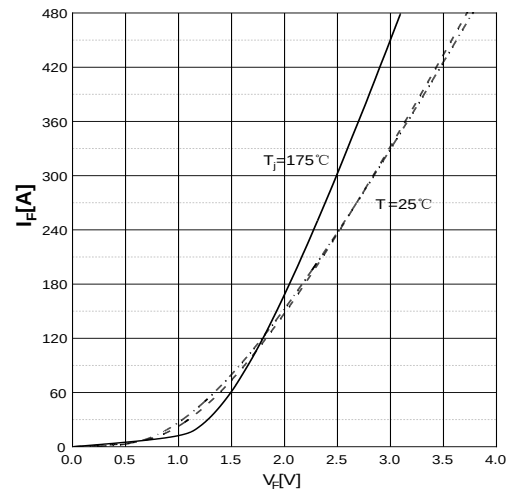


Fig. 9 Diode forward voltage as a function of junction temperature V_F vs. T_J

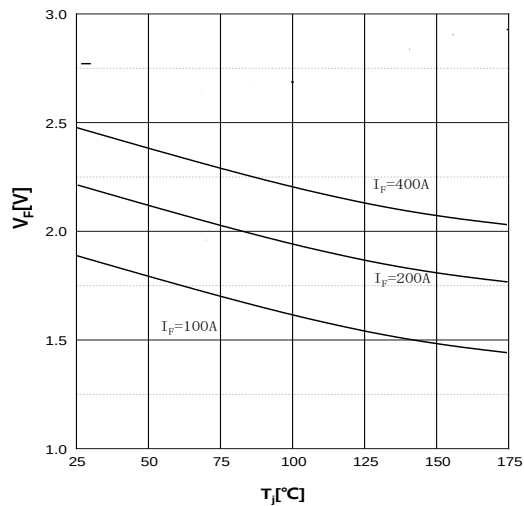


Fig. 10 Switching times vs. Collector current I_C

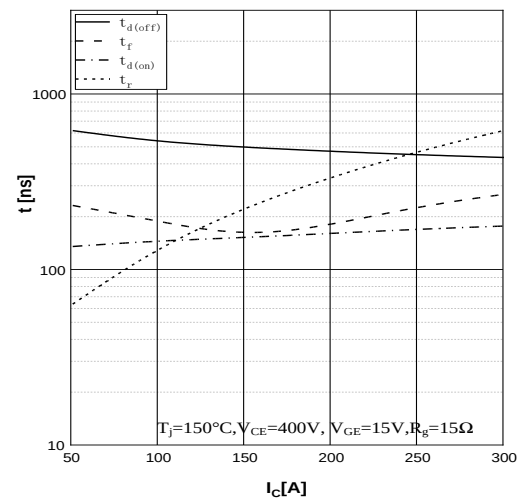


Fig. 11 Switching times vs. Gate resistor R_g

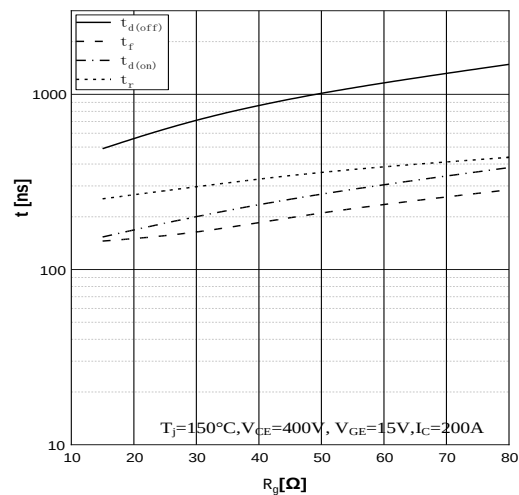


Fig. 12 Switching times vs. Junction temperature T_J

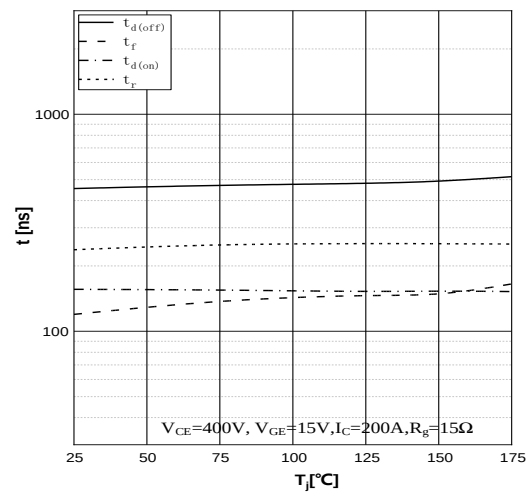


Fig. 13 Switching energy loss vs. Collector current I_C

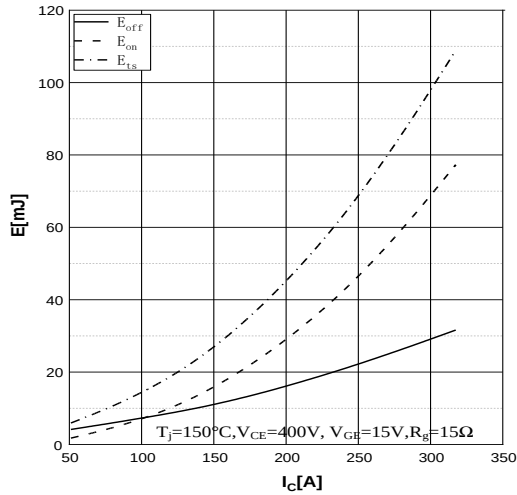


Fig. 14 Switching energy loss vs. Gate resistor R_g

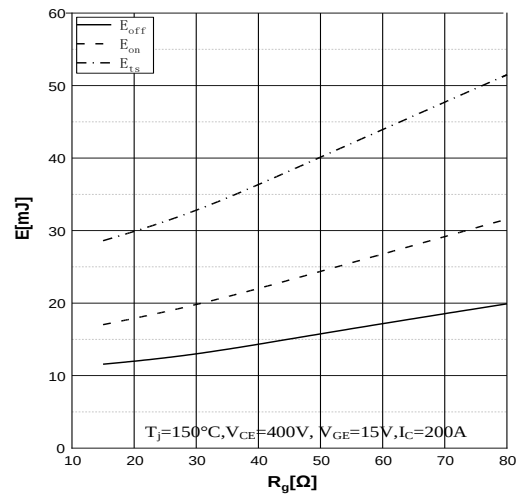


Fig. 15 Reverse recovery times as a function of diode current slope t_{rr} vs. di_F/dt

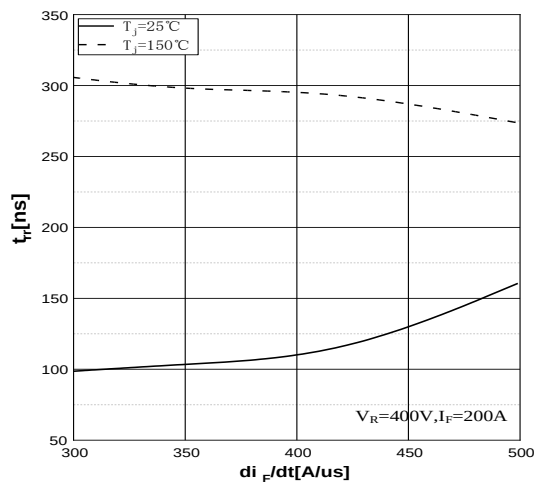


Fig. 16 Reverse recovery charge as a function of diode current slope Q_{rr} vs. di_F/dt

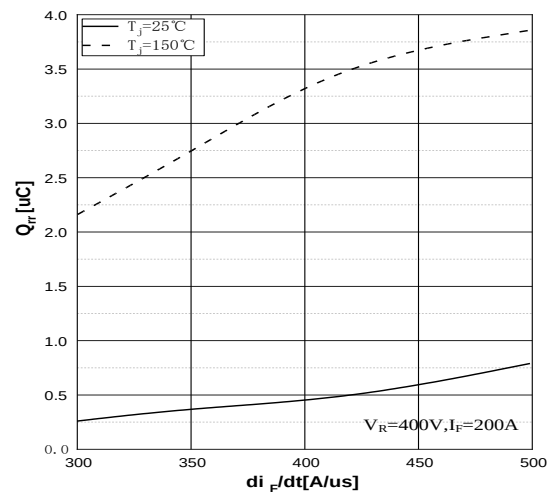


Fig. 17 Reverse recovery current as a function of diode current slope I_{rr} vs. di_F/dt

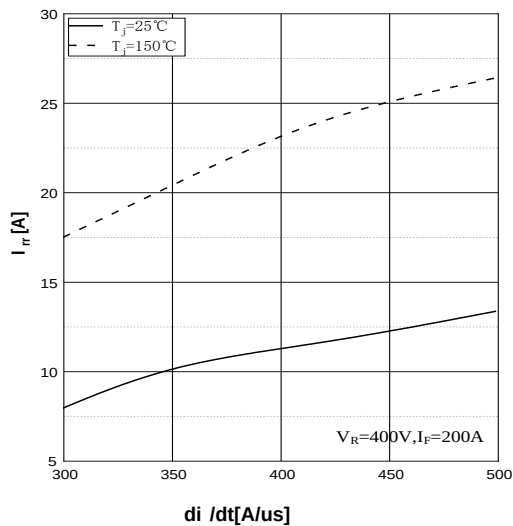


Fig. 18 Reverse recovery energy as a function of diode current slope E_{rr} vs. di_F/dt

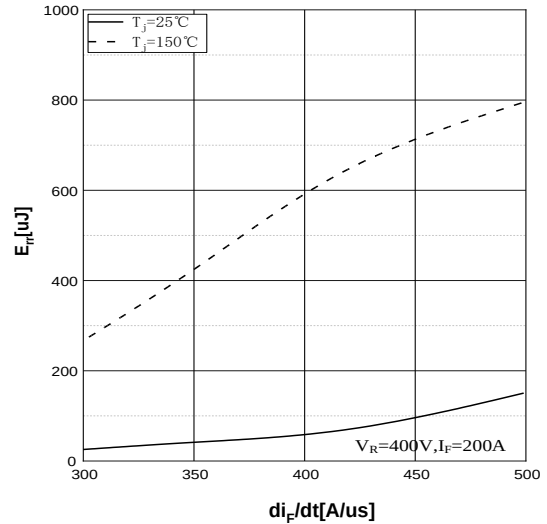


Fig. 19 Rate of Fall of reverse recovery current as a function of diode current slope di_F/dt vs. di_F/dt

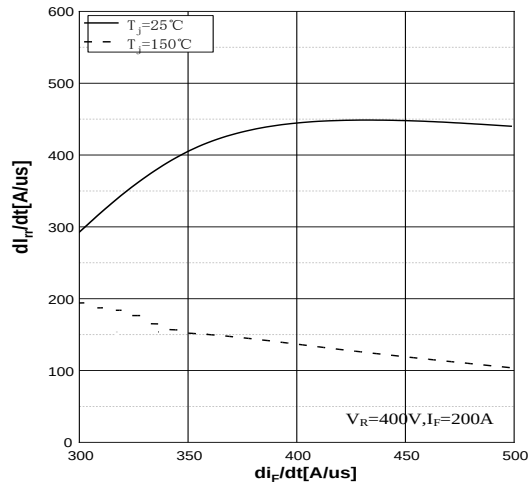


Fig. 20 Power dissipation as a function of case temperature P_{tot} vs. T_c

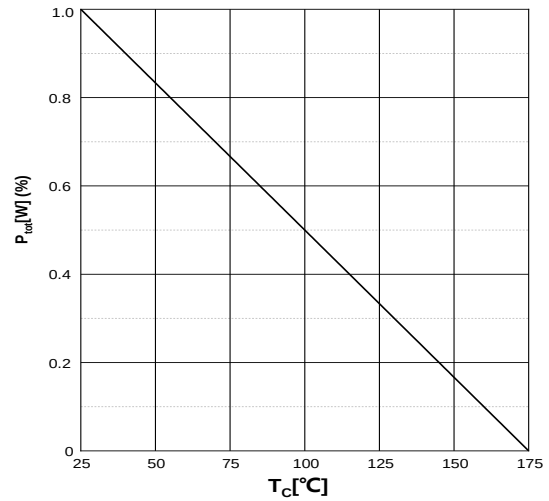


Fig. 21 IGBT transient thermal impedance Z_{thjc} (TO-264)

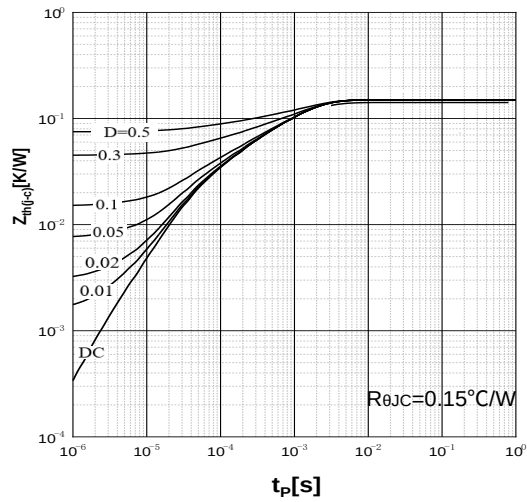
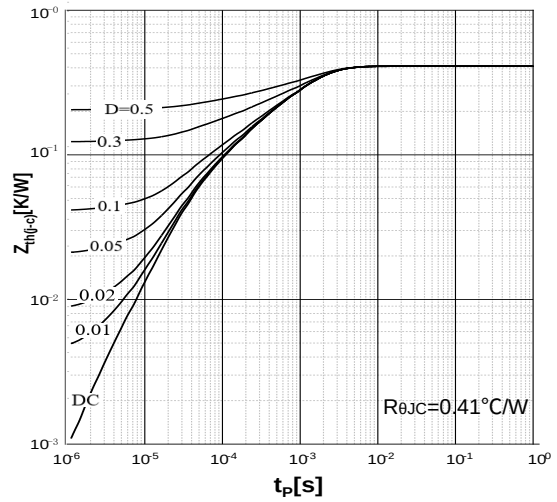
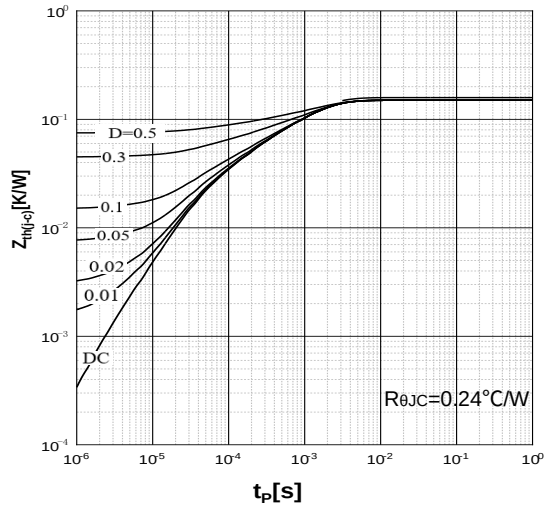


Fig. 22 Diode transient thermal impedance Z_{thjc} (TO-264)



**Fig. 23 IGBT transient thermal impedance Z_{thjc}
(TO-247-4L)**



**Fig. 24 Diode transient thermal impedance Z_{thjc}
(TO-247-4L)**

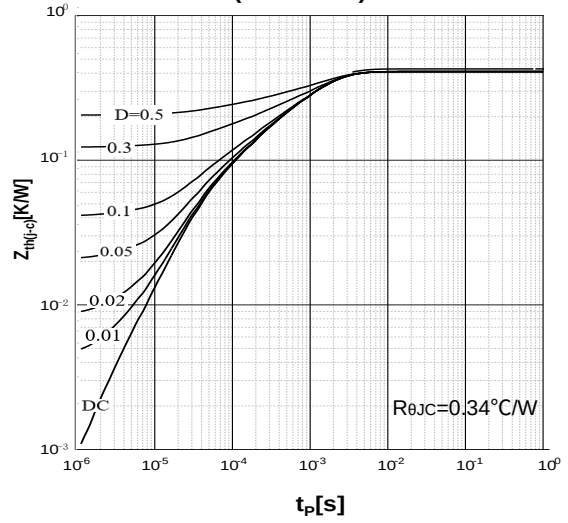
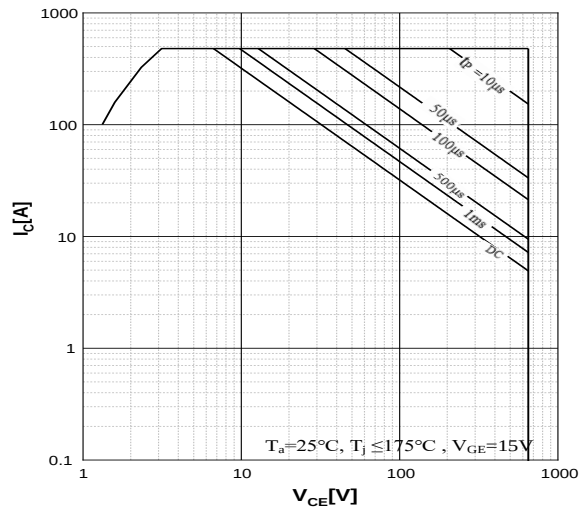


Fig. 25 FBSOA characteristic



Package Mechanical DATA

