MGB(YF)15T65F7

650V/15A IGBT

Features

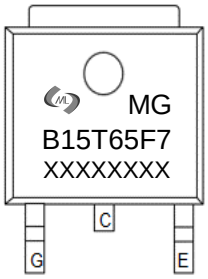
- IGBT CHIP(Trench+Field Stop technology)
- Low Vcesat(typ) 1.5V@IC=15A
- Maximum junction temperature 175℃
- Short circuit withstand time 10us
- Low gate charge Qg

Application

- DC-AC inverters
- Motion/servo control
- UPS systems

Product Summary

V_{CE}	I_C (T_J=100℃)	$V_{CE(sat)}$
650V	15A	1.5V



B15T65F7 : Device code
XXXXXXXX : Code

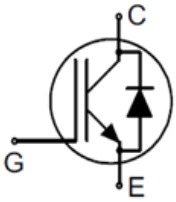
Marking and pin assignment



TO-263
top view



TO-220F
top view



Schematic diagram

Pb-Free RoHS HAL Halogen-Free

Absolute Maximum Ratings (TC=25℃unless otherwise noted)				
Symbol	**Parameter**		**Rating**	**Unit**
Common Ratings (TC=25°C Unless Otherwise Noted)				
IGBT, Inverter				
V_{CES}	Collector Emitter Voltage	T_J=25°C	650	V
V_{GES}	Gate Emitter Voltage		±30	V
I_C	DC Collector Current	Tc=25°C	32	A
		Tc=100°C	15	A
I_{CRM}	Pulsed Collector Current, Limited by T_{vjmax}	tp=1ms	64	A
P_D	Power Dissipation	Tc=25°C	128.7	W
		Tc=100°C	64.4	W
Diode, Inverter				
V_{RRM}	Repetitive Reverse Voltage	T_J=25°C	650	V
I_F	Forward current,DC	Tc=25°C	32	A
		T_J=100°C	15	A
T_J,T_{stg}	Operating Junction and Storage Temperature Range		-55 to +175	°C

Ordering Information (Example)						
Type	**Package**	**Marking**	**Minimum Package(pcs)**	**Inner Box Quantity(pcs)**	**Outer Carton Quantity(pcs)**	**Delivery Mode**
MGB15T65F7	TO-263	B15T65F7	800	800	4,000	13"reel
MGYF15T65F7	TO-220F	YF15T65F7	50	1,000	5,000	Tube

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IGBT，Inverter

Electrical Characteristics (TC=25℃ unless otherwise noted)							
Symbol	**Parameter**	**Condition**		**Min**	**Typ**	**Max**	**Unit**
Static Electrical Characteristics @ TC= 25°C (unless otherwise stated)							
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	V_{GE}=0V, I_{CE}=0.25mA		650			
$V_{GE(th)}$	Gate Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=0.25mA		4.5	5.3	6.0	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=15A, V_{GE}=15V, T_J=25°C		--	1.5	2	V
		I_C=15A, V_{GE}=15V, T_J=150°C		--	1.8	--	V
I_{CES}	Collector Leakage Current	V_{CE}=650V, V_{GE}=0V, T_J=25°C		--	--	500	nA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=20V, T_J=25°C		--	--	500	nA
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)							
Q_g	Gate Charge	V_{CE}=520V, I_C=15A , V_{GE}=0 to 15V		--	40.8	--	nC
Q_{ge}	Gate to Emitter Charge			--	11.5	--	nC
Q_{gc}	Gate to Collector Charge			--	15	--	nC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz		--	1123	--	nF
C_{oes}	Output Capacitance			--	44	--	nF
C_{res}	Reverse Transfer Capacitance			--	4	--	pF
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V,I_C=15A $R_{G(on)}$ =10Ω,$R_{G(off)}$ =10Ω V_{GE}=15V, Inductive Load	T_J=25℃	--	8	--	ns
			T_J=150℃	--	8	--	ns
t_r	Turn-on Rise Time		T_J=25℃	--	24	--	ns
			T_J=150℃	--	24	--	ns
$t_{d(off)}$	Turn-Off Delay Time		T_J=25℃	--	66	--	ns
			T_J=150℃	--	88	--	ns
t_f	Turn-Off Fall Time		T_J=25℃	--	76	--	ns
			T_J=150℃	--	118	--	ns
E_{on}	Turn on Energy		T_J=25℃		0.21		mJ
			T_J=150℃	--	0.24	--	mJ
E_{off}	Turn off Energy		T_J=25℃	--	0.31	--	mJ
			T_J=150℃	--	0.43	--	mJ

Diode，Inverter

Absolute Maximum Ratings (TC=25℃unless otherwise noted)							
Symbol	**Parameter**			**Min**	**Typ**	**Max**	**Unit**
Common Ratings (TC=25°C Unless Otherwise Noted)							
V_F	Forward Voltage	I_F=15A , V_{GE}=0V,	T_J=25°C	--	1.6	2.2	V
			T_J=150°C	--	1.4	--	V
t_{rr}	Reverse Recovery Time	I_F=15A , V_R=400V dIF/dt=-200A/μs	T_J=25°C	--	45	--	ns
			T_J=150°C	--	92	--	ns
I_{rrm}	Peak Reverse Recovery Current		T_J=25°C	--	6.2	--	A
			T_J=150°C	--	10	--	A
Q_{rr}	Reverse Recovery Charge		T_J=25°C	--	141.5	--	μC
			T_J=150°C	--	475.5	--	μC

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Typical Operating Characteristics

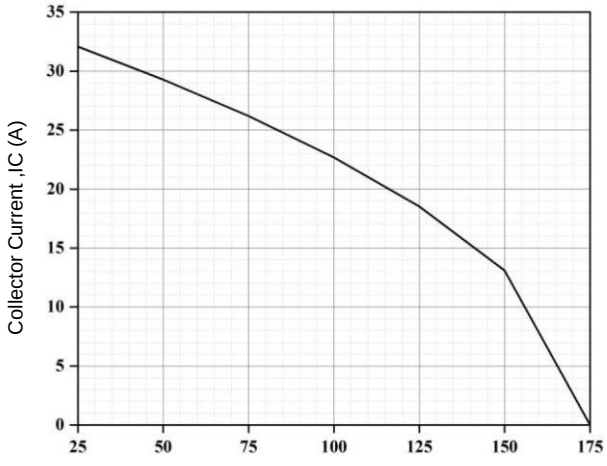


Figure 1. Collector current as a function of case temperature

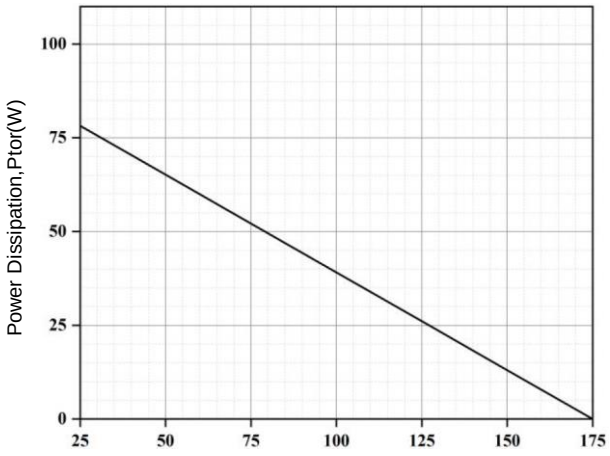


Figure 2. Power dissipation as a function of case temperature

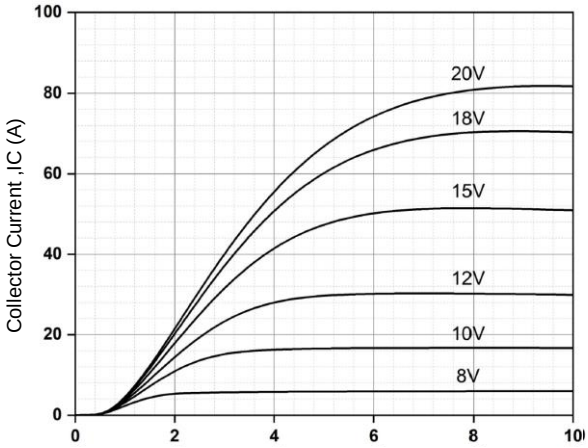


Figure 3. Typical output characteristic（Tj=25℃）

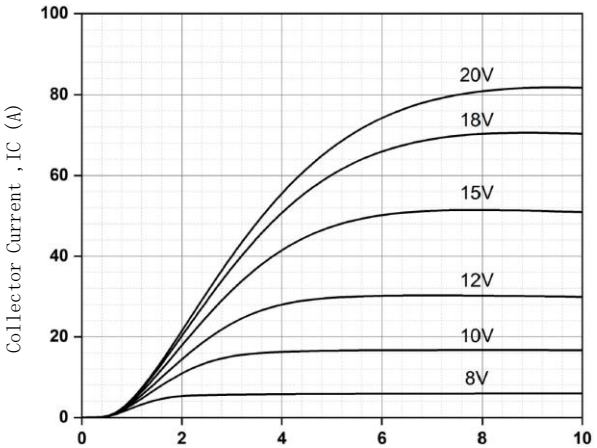


Figure 4. Typical output characteristic（Tj=150℃）

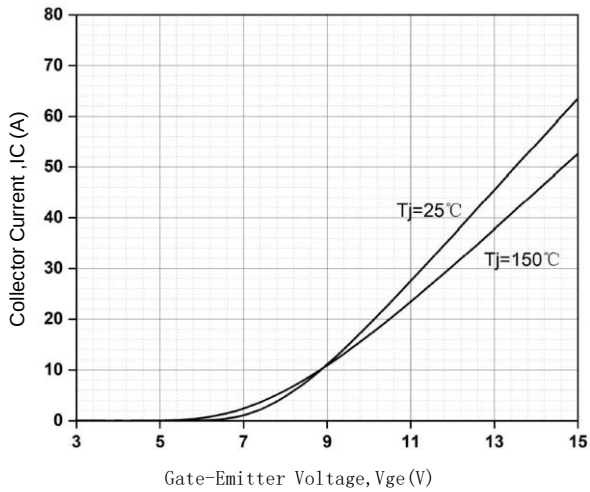


Figure 5. Typical transfer characteristic（V_{CE}=10V）

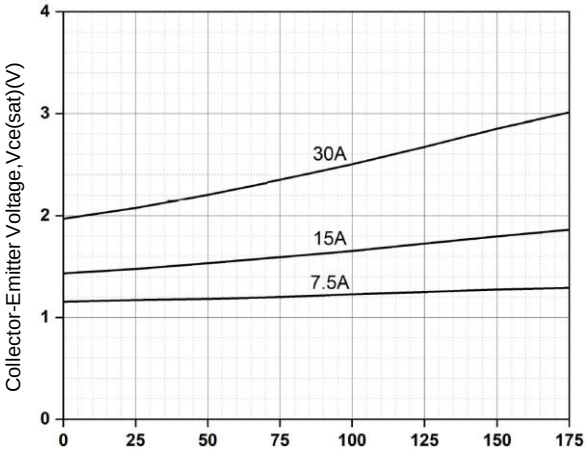


Figure 6. Typical collector-emitter saturation voltage as a function of junction temperature

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Typical Operating Characteristics

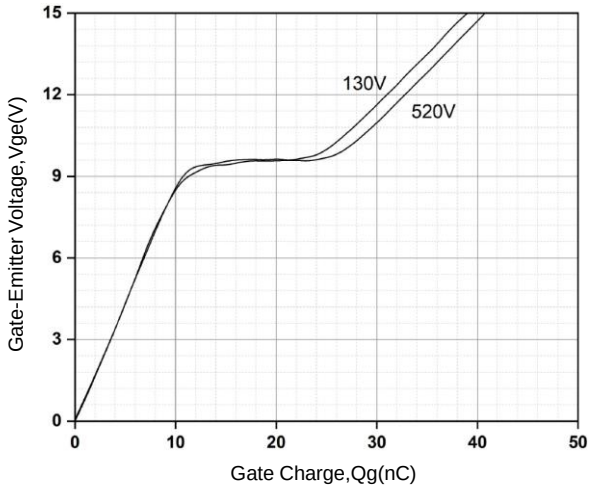


Figure 7. Typical gate charge

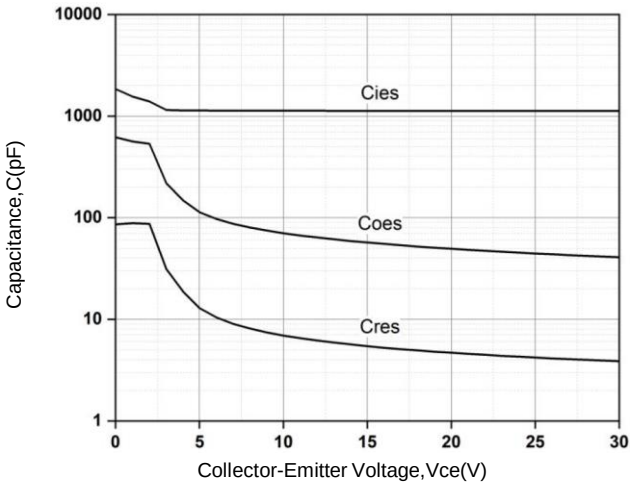


Figure 8. Typical capacitance as a function of collector-emitter voltage（f=1MHz）

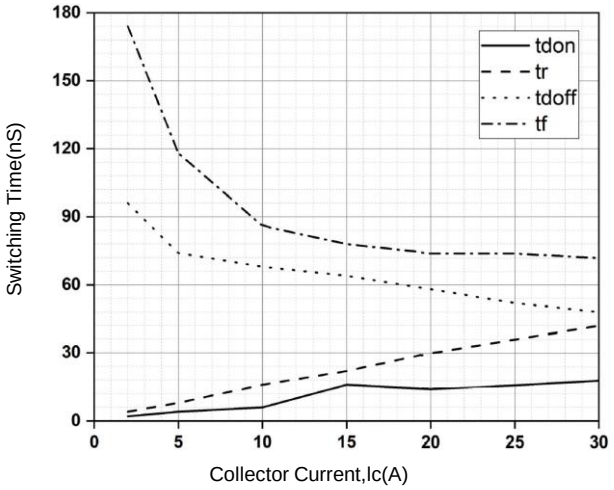


Figure 9. Typical switching times as a function of collector current（Tj=25℃，V_{CC}=400V，Rg=10Ω）

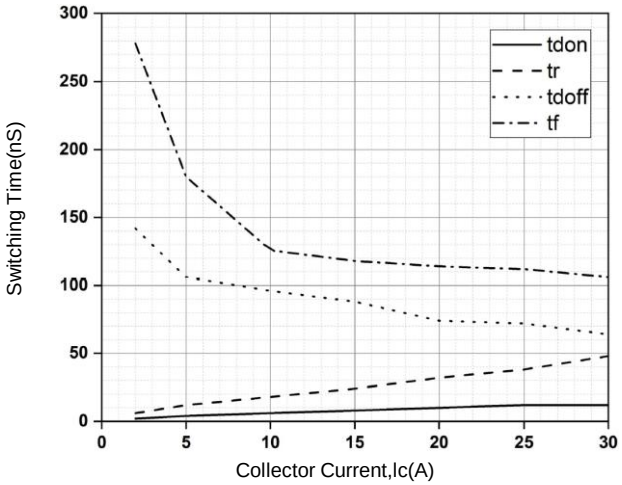


Figure 10. Typical switching times as a function of collector current（Tj=150℃，V_{CC}=400V，Rg=10Ω）

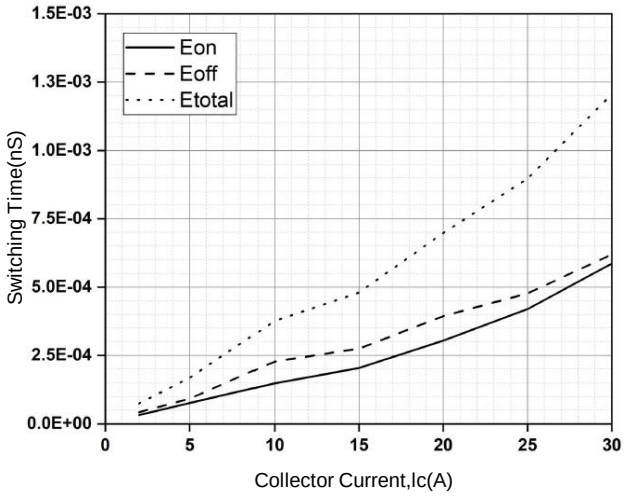


Figure 11. Typical switching energy losses as a function of collector current（Tj=25℃，V_{CC}=400V，Rg=10Ω）

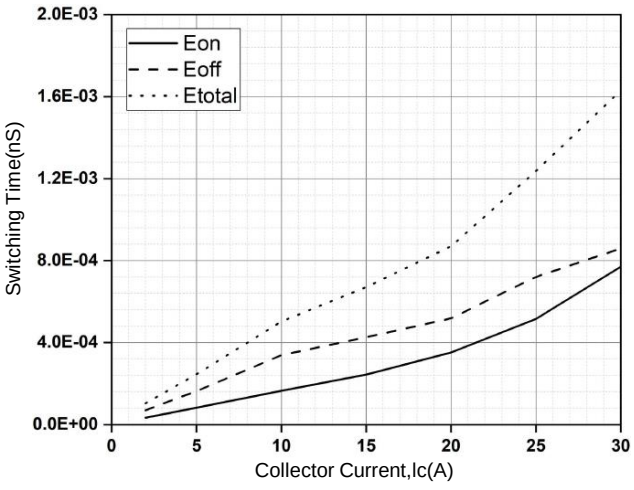


Figure 12. Typical switching energy losses as a function of collector current（Tj=150℃，V_{CC}=400V，Rg=10Ω）

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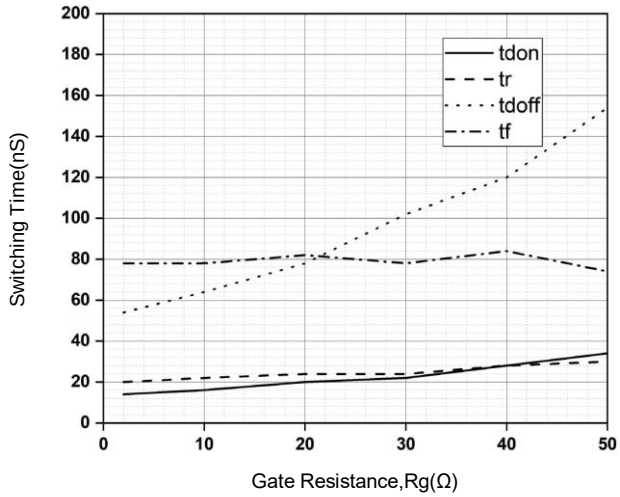


Figure 13. Typical switching times as a function of gate resistor（Tj=25℃，V_{CC}=400V，Ic=15A）

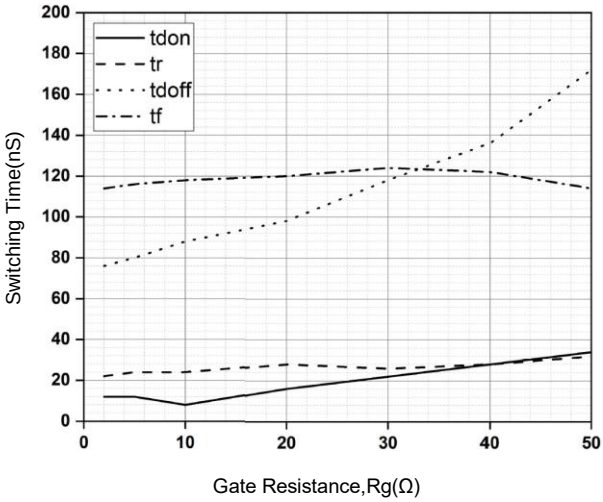


Figure 14. Typical switching times as a function of gate resistor（Tj=150℃，V_{CC}=400V，Ic=15A）

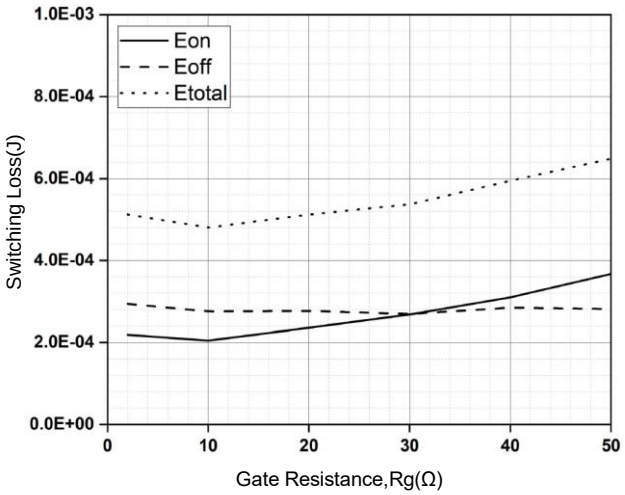


Figure 16. Typical switching energy losses as a function of gate resistor（Tj=25℃，V_{CC}=400V，Ic=15A）

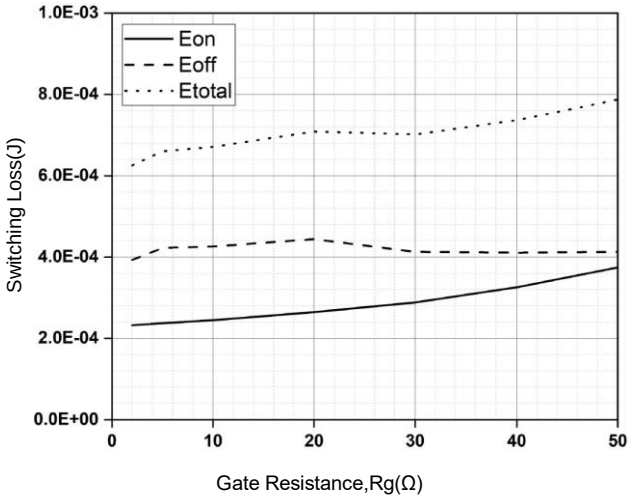


Figure 16. Typical switching energy losses as a function of gate resistor（Tj=150℃，V_{CC}=400V，Ic=15A）

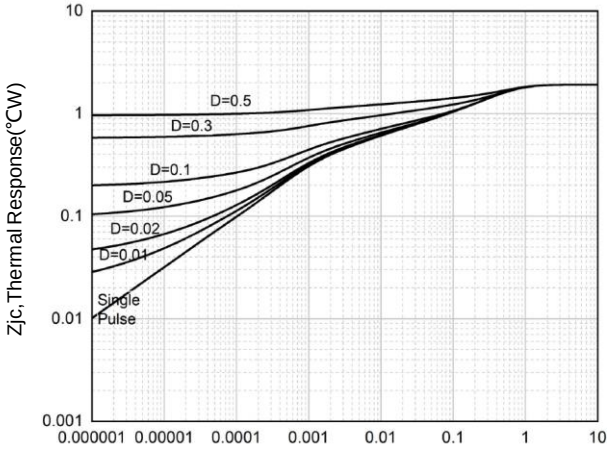


Figure 17. IGBT transient thermal impedance(D=tp/T)

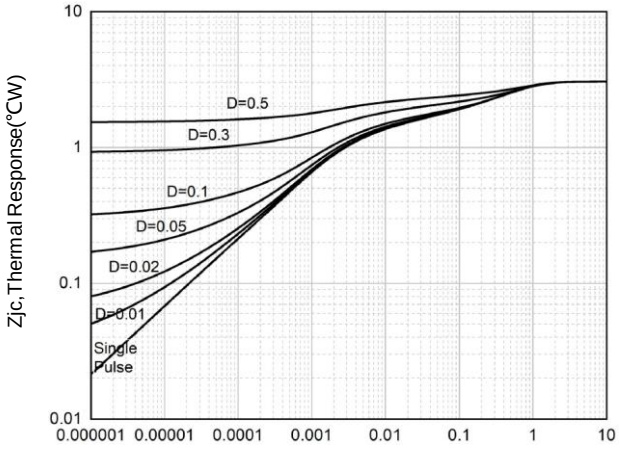


Figure 18. Diode transient thermal impedance as a function of pulse width(D=tp/T)

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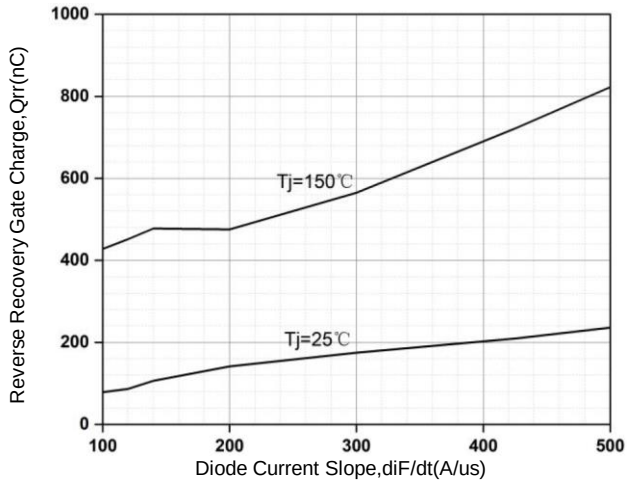


Figure 19. Typical reverse recovery charge as a function of diode current slope（V_{CC}=400V，IF=15A）

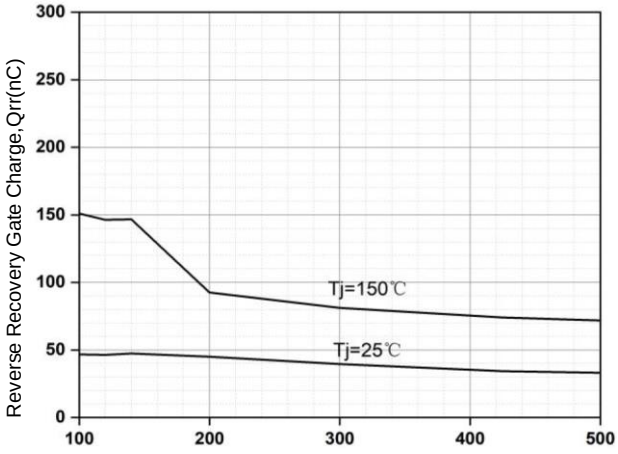


Figure 20. Typical reverse recovery time as a function of diode current slope（V_{CC}=400V，IF=15A）

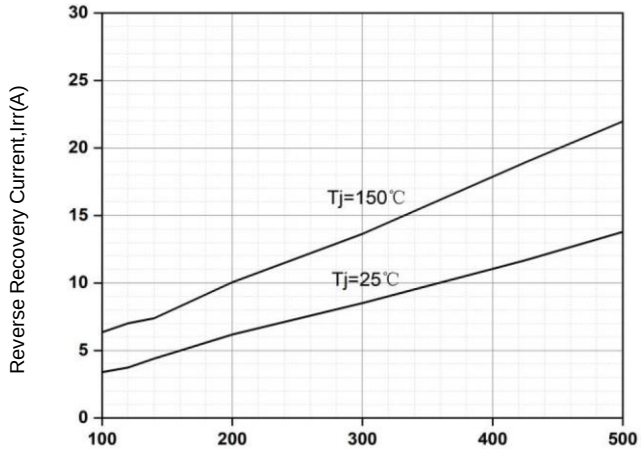


Figure 21. Typical reverse recovery current as a function of diode current slope（V_{CC}=400V，IF=15A）

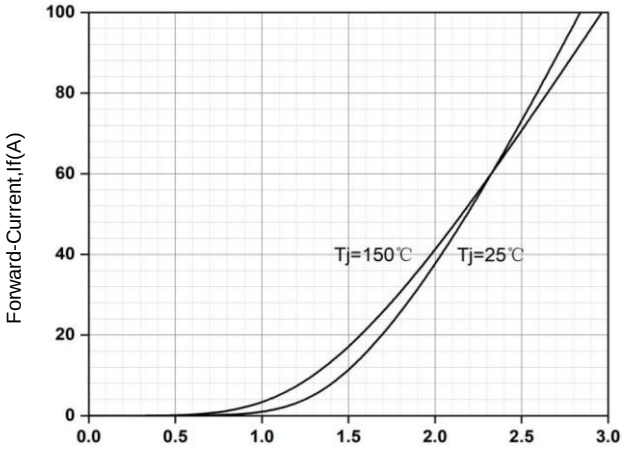


Figure 22. Typical diode forward current as a function of forward voltage

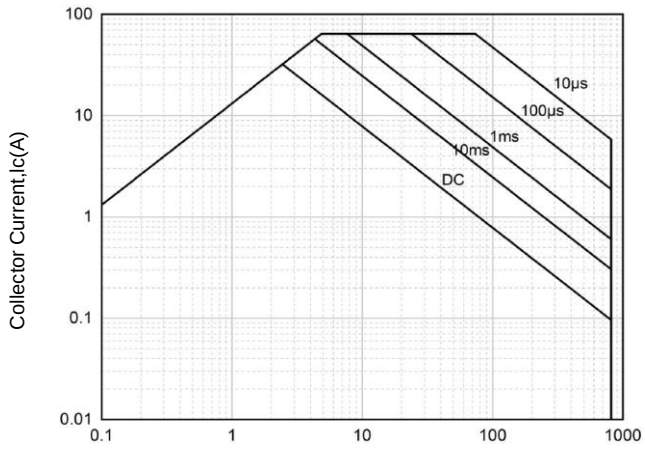
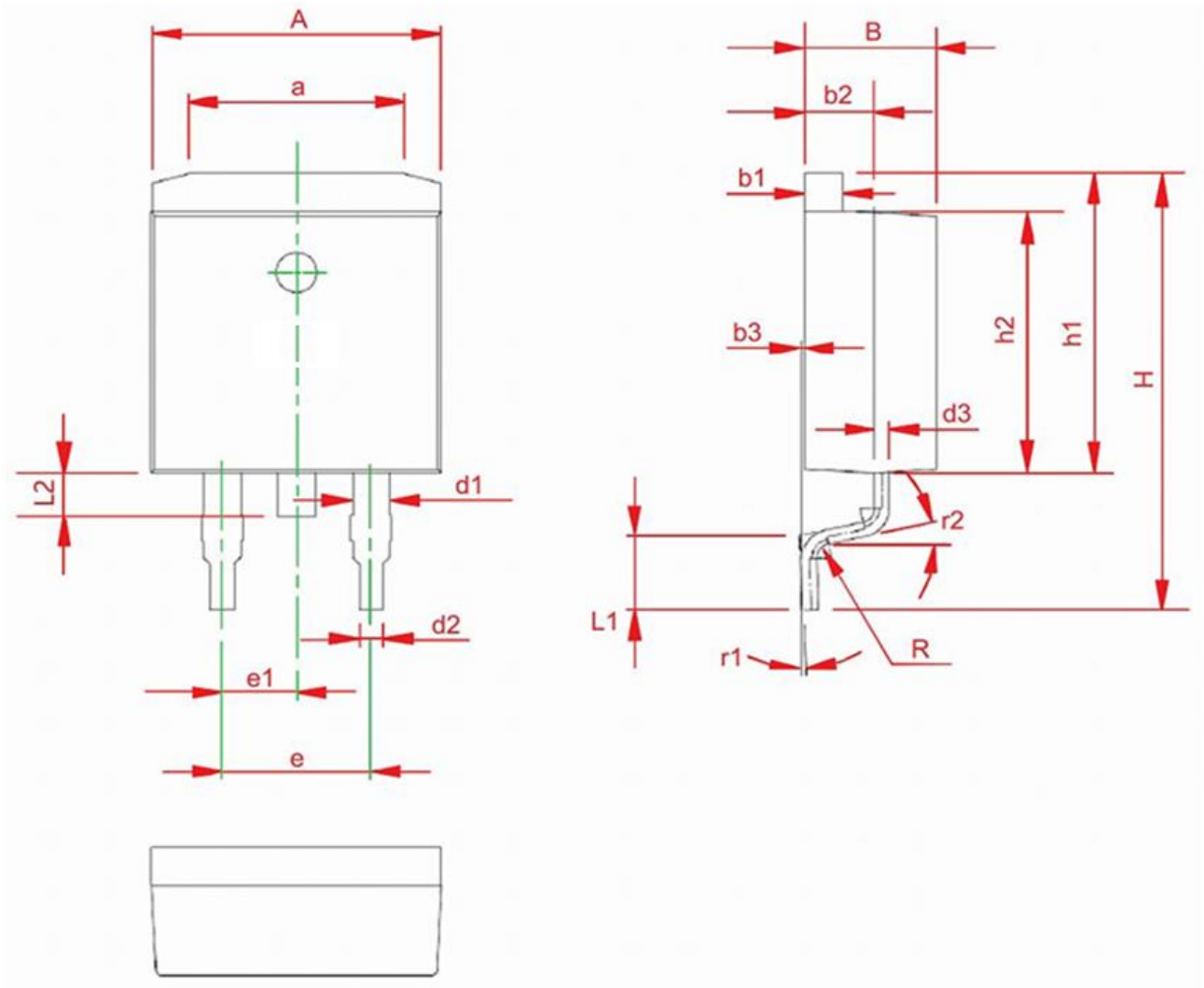


Figure 23. Safe operating area

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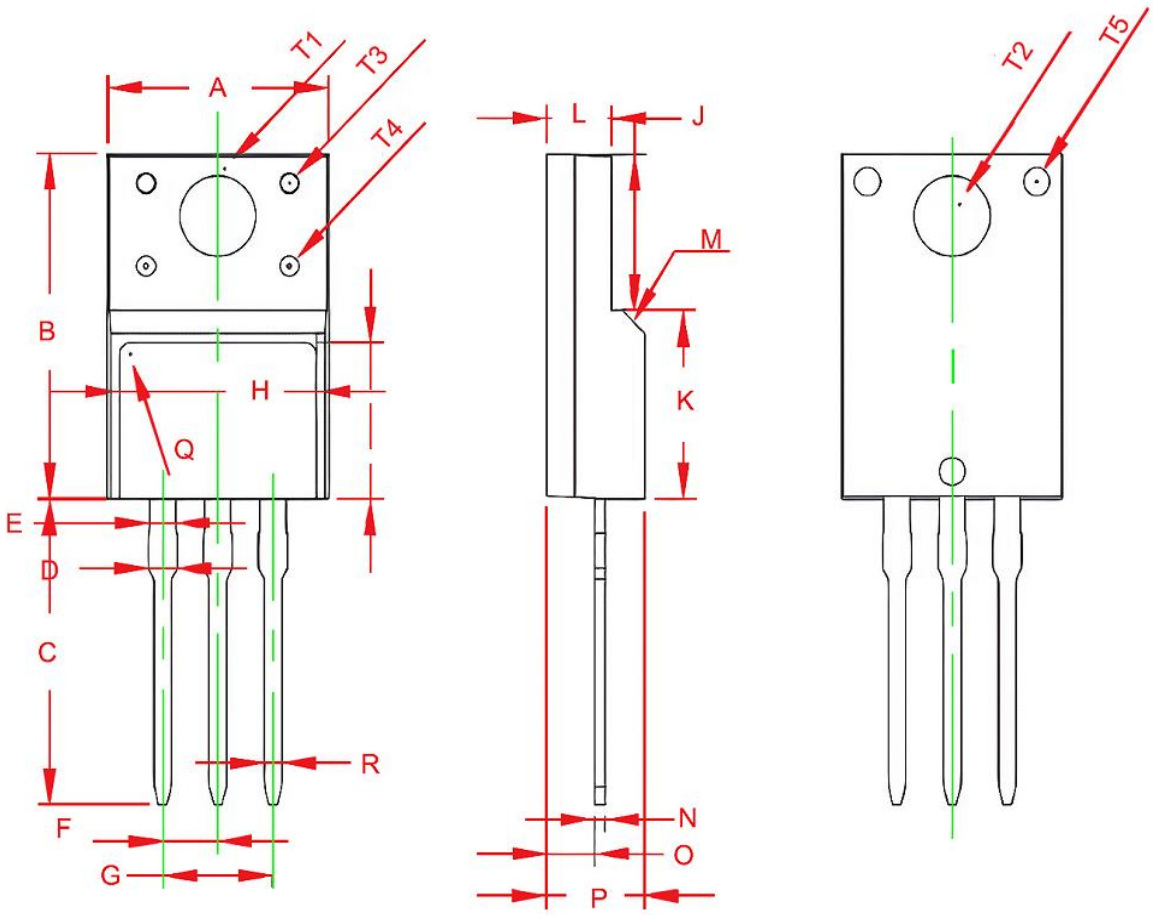
TO-263 Package information



Symbol	Dimensions in Millimeters(mm)		Symbol	Dimensions in Millimeters(mm)	
	Min	Max		Min	Max
A	9.700	10.300	e1	2.54TYP	
a	7.000	7.800	H	14.800	15.600
B	4.300	4.700	h1	10.200	10.700
b1	1.250	1.350	h2	8.900	9.400
b2	2.200	2.600	L1	2.400	2.900
b3	0.000	0.200	L2	1.300	1.800
d1	1.200	1.400	R	0.5TYP	
d2	0.700	0.900	r1	0°	8°
d3	0.400	0.600	r2	12°TYP	
e	5.08TYP				

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TO-220F Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	9.960	10.360	0.392	0.407
B	15.670	16.070	0.616	0.632
C	13.140	13.540	0.517	0.533
D	1.200	1.400	0.047	0.055
E	1.200TYP		0.047TYP	
F	2.540TYP		0.100TYP	
G	5.080TYP		0.200TYP	
H	7.600	8.000	0.299	0.314
I	7.100	7.500	0.279	0.295
J	6.480	6.880	0.255	0.270
K	8.990	9.390	0.353	0.369
L	2.340	2.740	0.092	0.107
M	45°TYP		45°TYP	
N	0.490	0.520	0.019	0.020
O	2.150	2.550	0.084	0.100
P	4.500	4.900	0.177	0.192
Q	0.500TYP		0.019TYP	
S	4.5°TYP		4.5°TYP	
T1	3.450TYP		0.135TYP	
T2	3.180TYP		0.125TYP	
T3	1.500TYP		0.059TYP	
T4	1.200TYP		0.047TYP	
T5	1.500TYP		0.059TYP	
R	0.770	0.830	0.030	0.032

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