MGP40H65B7

650V/40A IGBT

Features

- IGBT CHIP(Trench+Field Stop technology)
- Low Vcesat(typ) 1.5V@IC=40A
- Maximum junction temperature 175℃
- Low gate charge Qg
- RoHS compliant

Application

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

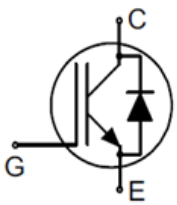
Product Summary

V_{CE}	I_C (T_J=100℃)	$V_{CE(sat)}$
650V	40A	1.5V

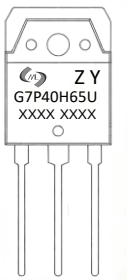


G C E

TO-247 top view



Schematic diagram



G7P40H65U : Device code
XXXXXXXX : Code

Marking and pin assignment

Pb-Free RoHS 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	80	A
		Tc=100°C	40	A
I_{CRM}	Pulsed Collector Current, Limited by T_{vjmax}	tp=1ms	120	A
P_D	Power Dissipation	Tc=25°C	347	W
		Tc=100°C	173	W
Diode, Inverter				
V_{RRM}	Repetitive Reverse Voltage	T_J=25°C	650	V
I_F	Forward current,DC	Tc=25°C	40	A
		T_J=100°C	20	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)**
MGP40H65B7	TO-3P	G7P40H65U	30	270	2,160

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IGBT，Inverter

$V_{GE(th)}$	Gate Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=0.25mA		4.5	5.0	6.0	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=40A, V_{GE}=15V, T_J=25°C		--	1.6	2.1	V
		I_C=40A, V_{GE}=15V, T_J=150°C		--	1.82	--	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=40A , V_{GE}=15V		--	109.32	--	nC
Q_{ge}	Gate to Emitter Charge			--	24.8	--	nC
Q_{gc}	Gate to Collector Charge			--	38.08	--	nC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz		--	3001	--	pF
C_{oes}	Output Capacitance			--	72	--	pF
C_{res}	Reverse Transfer Capacitance			--	11	--	pF
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V,I_C=40A $R_{G(on)}$ =10Ω,$R_{G(off)}$ =10Ω V_{GE}=15V, Inductive Load	T_J=25℃	--	28	--	ns
			T_J=150℃	--	26	--	ns
t_r	Turn-on Rise Time		T_J=25℃	--	60	--	ns
			T_J=150℃	--	58	--	ns
$t_{d(off)}$	Turn-Off Delay Time		T_J=25℃	--	134	--	ns
			T_J=150℃	--	144	--	ns
t_f	Turn-Off Fall Time		T_J=25℃	--	60	--	ns
			T_J=150℃	--	74	--	ns
E_{on}	Turn on Energy		T_J=25℃		1.04		mJ
			T_J=150℃	--	1.12	--	mJ
E_{off}	Turn off Energy		T_J=25℃	--	0.73	--	mJ
			T_J=150℃	--	0.94	--	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=20A , V_{GE}=0V,	T_J=25°C	--	1.70	2.2	V
			T_J=150°C	--	1.56	--	V
t_{rr}	Reverse Recovery Time	I_F=20A , V_R=400V dIF/dt=200A/μs	T_J=25°C	--	41.8	--	ns
			T_J=150°C	--	99.2	--	ns
I_{rrm}	Peak reverse recovery current		T_J=25°C	--	6.2	--	A
			T_J=150°C	--	11.3	--	A
Q_{rr}	Repetitive peak forward current		T_J=25°C	--	134.6	--	nC
			T_J=150°C	--	576.5	--	nC

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Typical Operating Characteristics

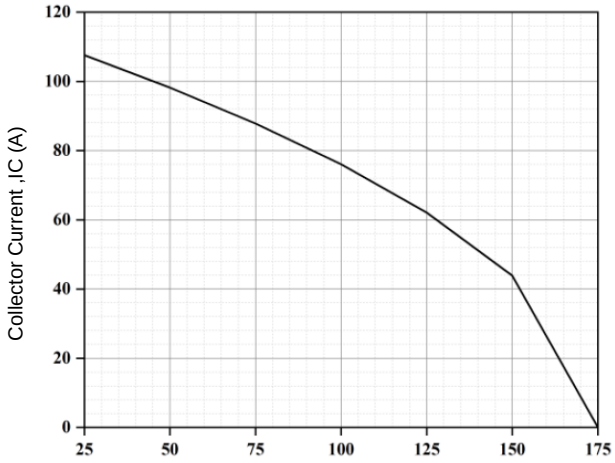


Figure 1. Collector current as a function of case temperature

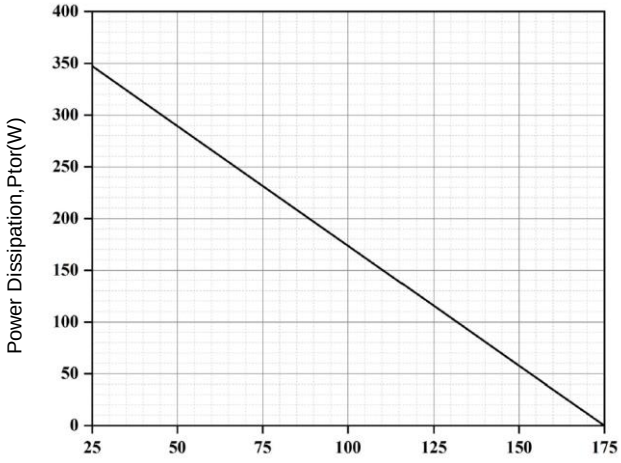


Figure 2. Power dissipation as a function of case temperature

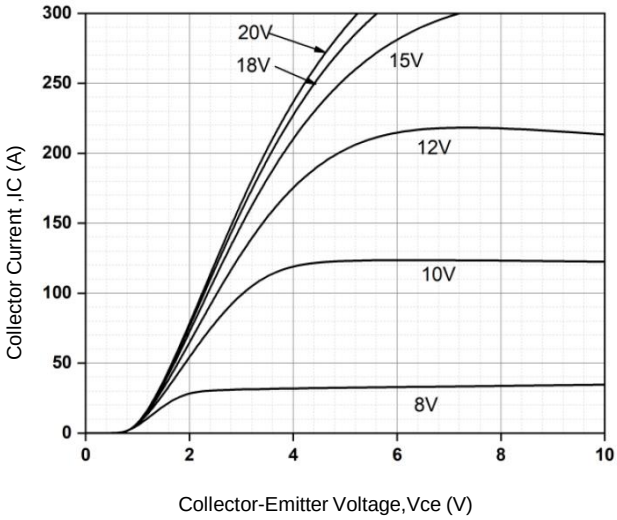


Figure 3. Typical output characteristic（Tj=25℃）

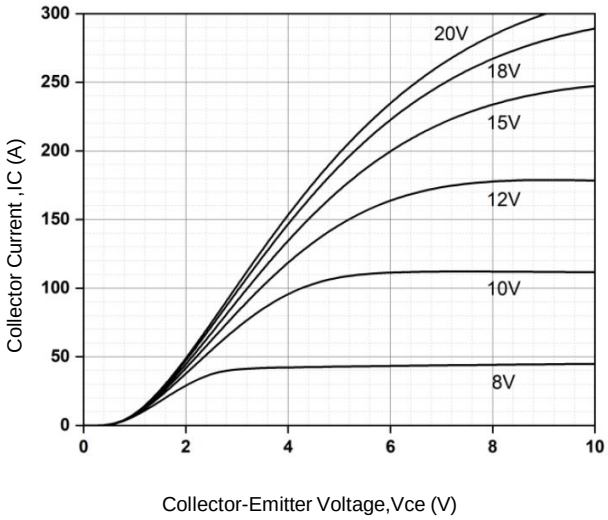


Figure 4. Typical output characteristic（Tj=150℃）

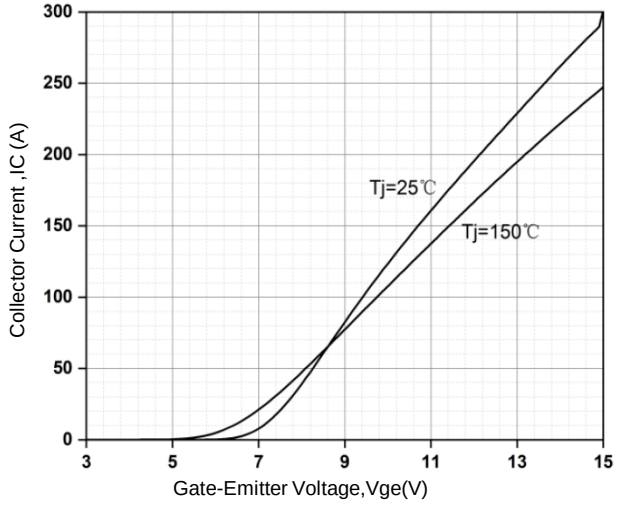


Figure 5. Typical transfer characteristic（V_{CE}=20V）

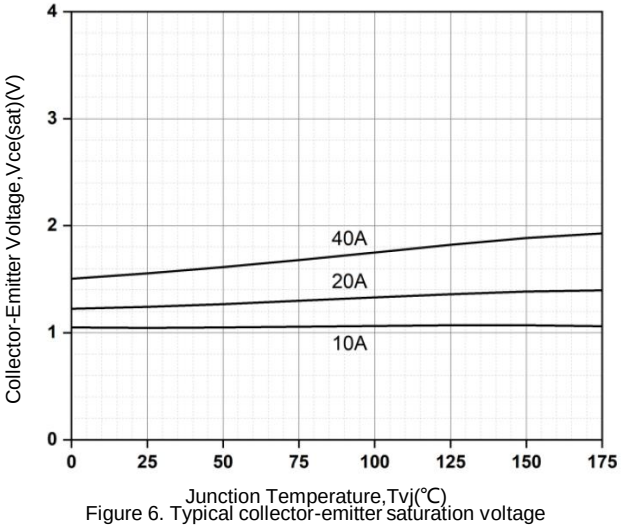


Figure 6. Typical collector-emitter saturation voltage as a function of junction temperature

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Typical Operating Characteristics

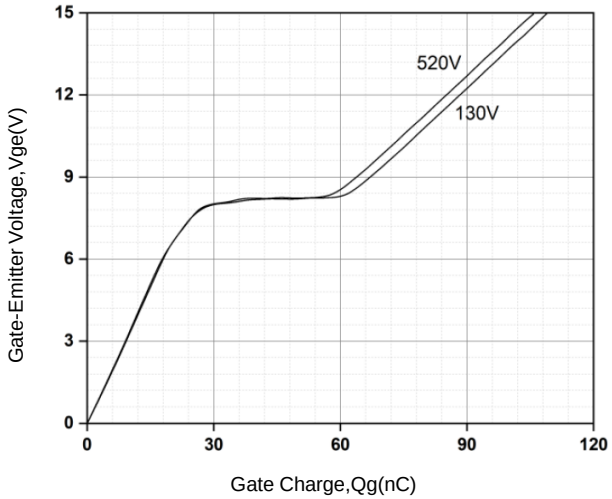


Figure 7. Typical gate charge

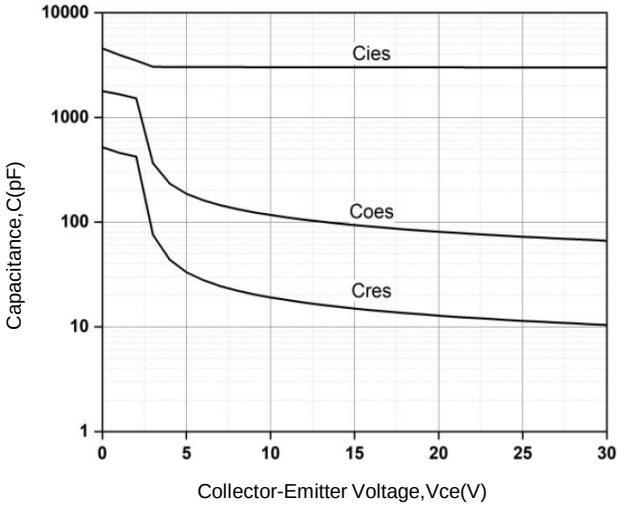


Figure 8. Typical capacitance as a function of collector-emitter voltage（f=1MHz）

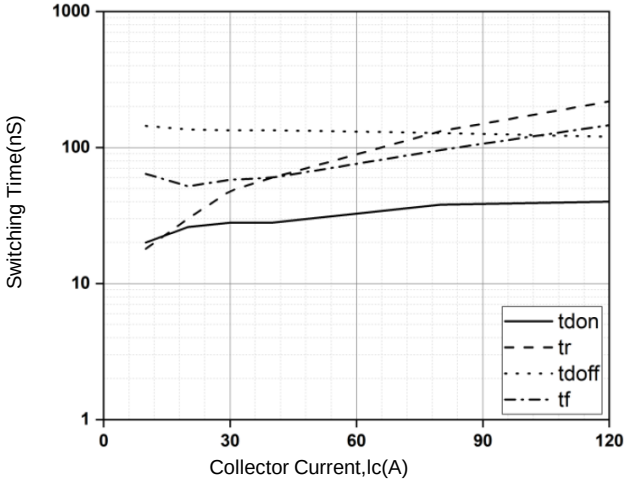


Figure 9. Typical switching times as a function of collector current（Tj=25℃，V_{CC}=400V，Rg=10Ω）

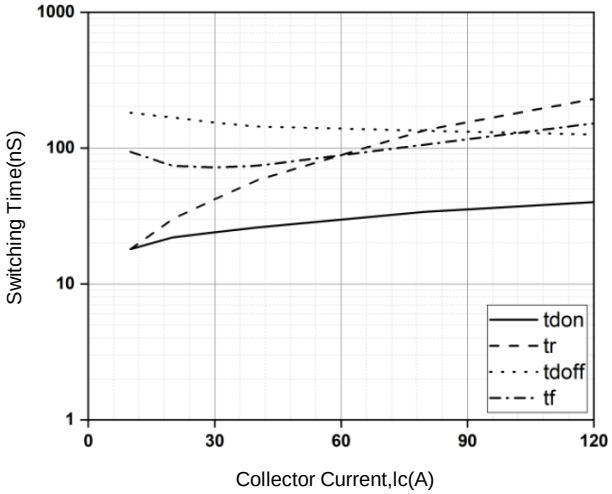


Figure 10. Typical switching times as a function of collector current（Tj=150℃，V_{CC}=400V，Rg=10Ω）

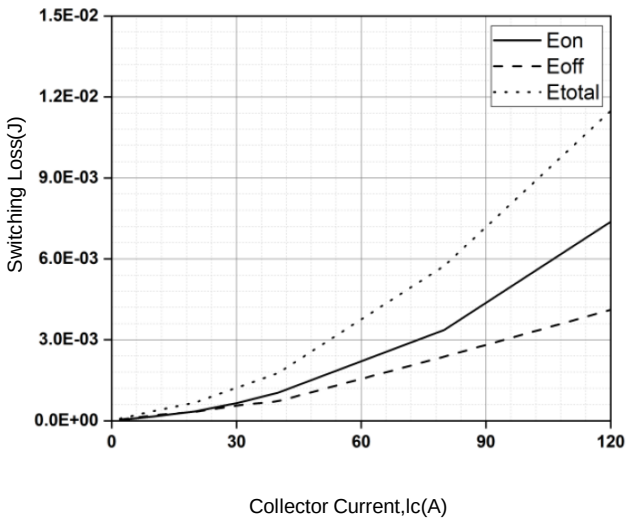


Figure 11. Typical switching energy losses as a function of collector current（Tj=25℃，V_{CC}=400V，Rg=10Ω）

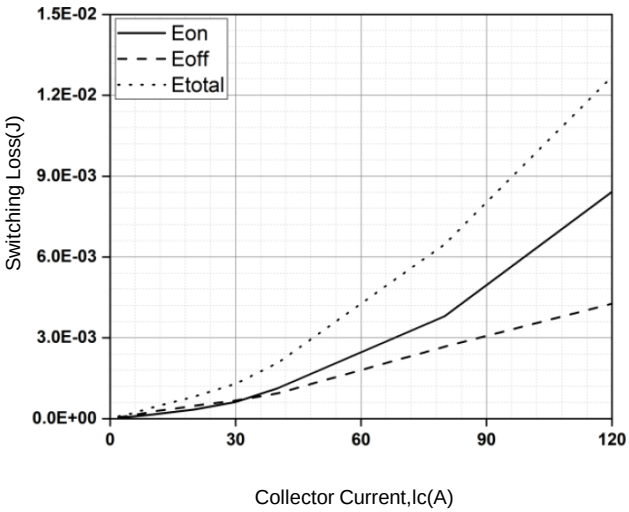


Figure 12. Typical switching energy losses as a function of collector current（Tj=150℃，V_{CC}=400V，Rg=10Ω）

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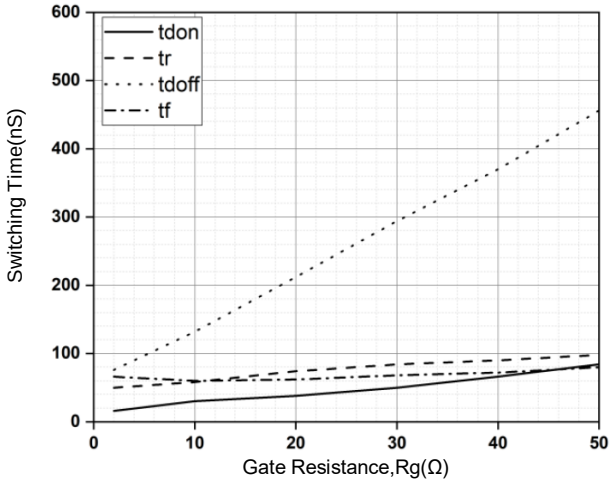


Figure 13. Typical switching times as a function of gate resistor（Tj=25℃，V_{CC}=400V，Ic=40A）

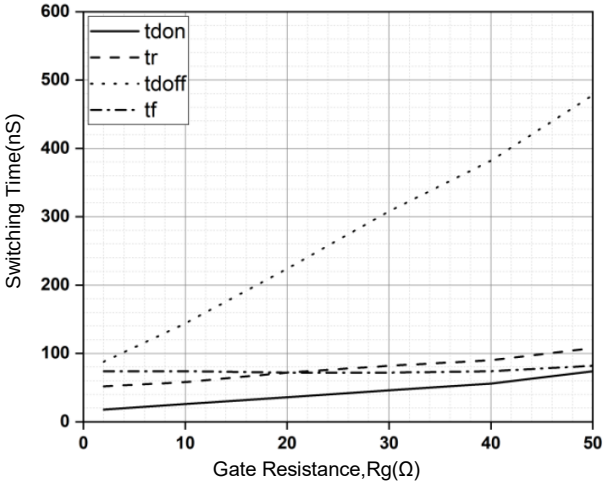


Figure 14. Typical switching times as a function of gate resistor（Tj=150℃，V_{CC}=400V，Ic=40A）

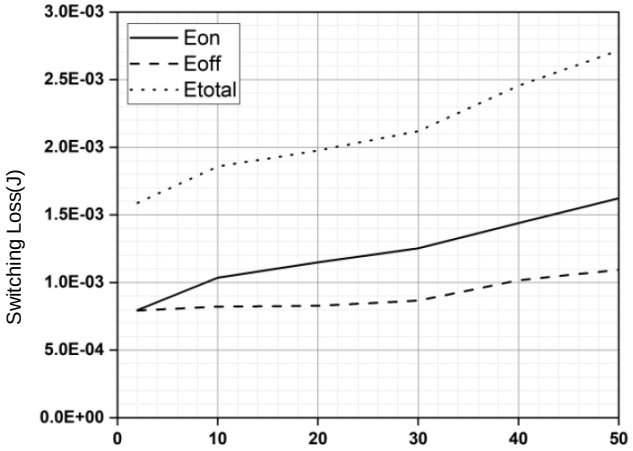


Figure 15. Typical switching energy losses as a function of gate resistor（Tj=25℃，V_{CC}=400V，Ic=40A）

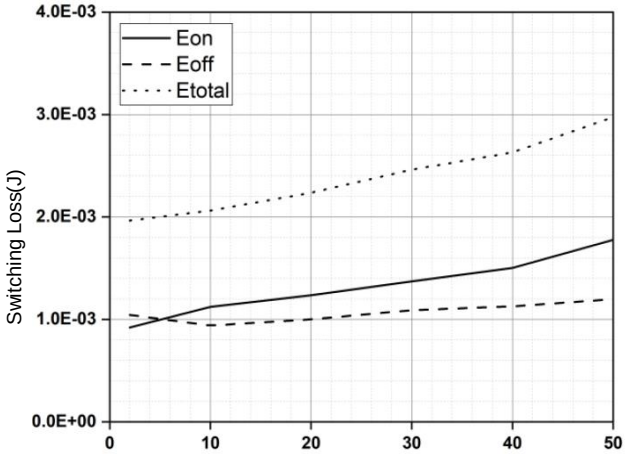


Figure 16. Typical switching energy losses as a function of gate resistor（Tj=150℃，V_{CC}=400V，Ic=40A）

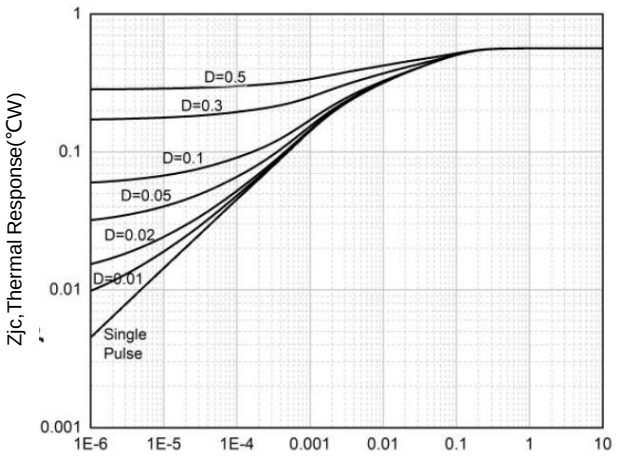


Figure 17. IGBT transient thermal impedance(D=tp/T)

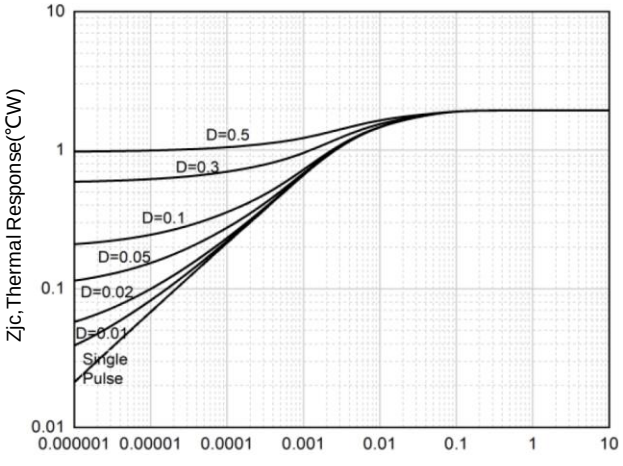


Figure 18. Diode transient thermal impedance as a function of pulse width(D=tp/T)

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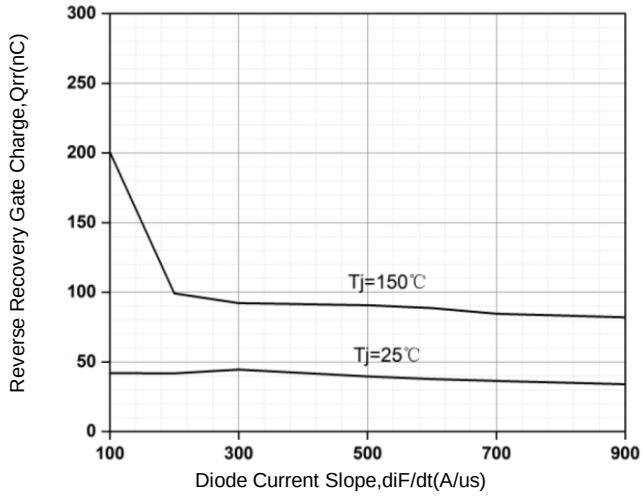


Figure 19. Typical reverse recovery charge as a function of diode current slope（V_{CC}=400V，IF=20A）

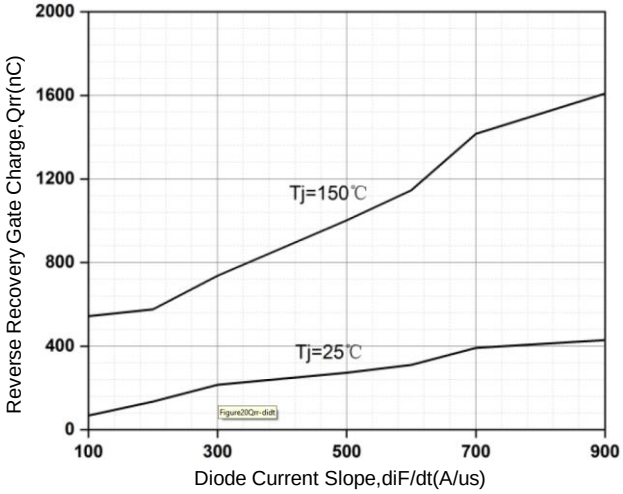


Figure 20. Typical reverse recovery time as a function of diode current slope（V_{CC}=400V，IF=20A）

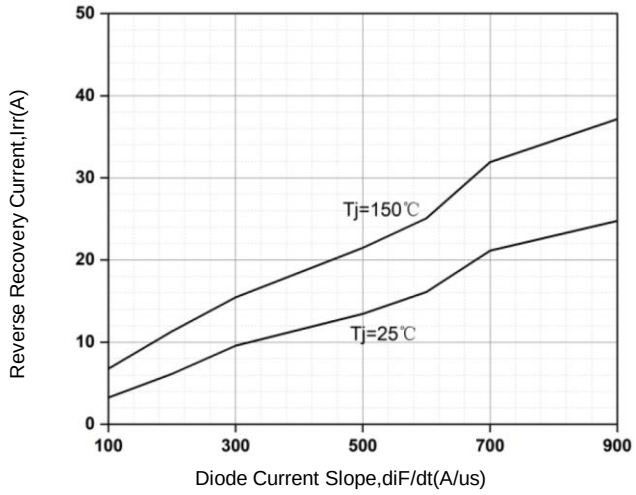


Figure 21. Typical reverse recovery current as a function of diode current slope（V_{CC}=400V，IF=20A）

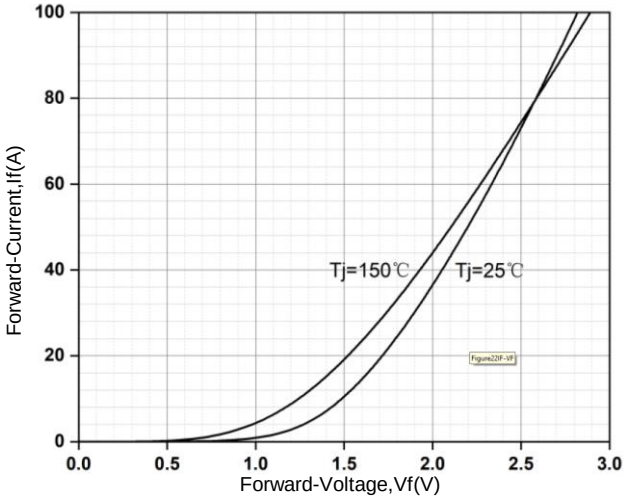


Figure 22. Typical diode forward current as a function of forward voltage

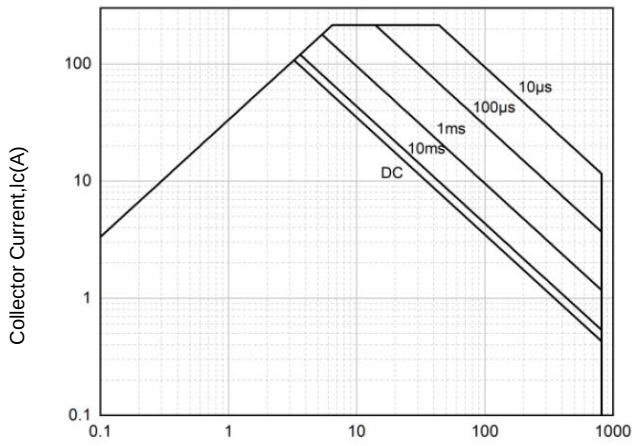
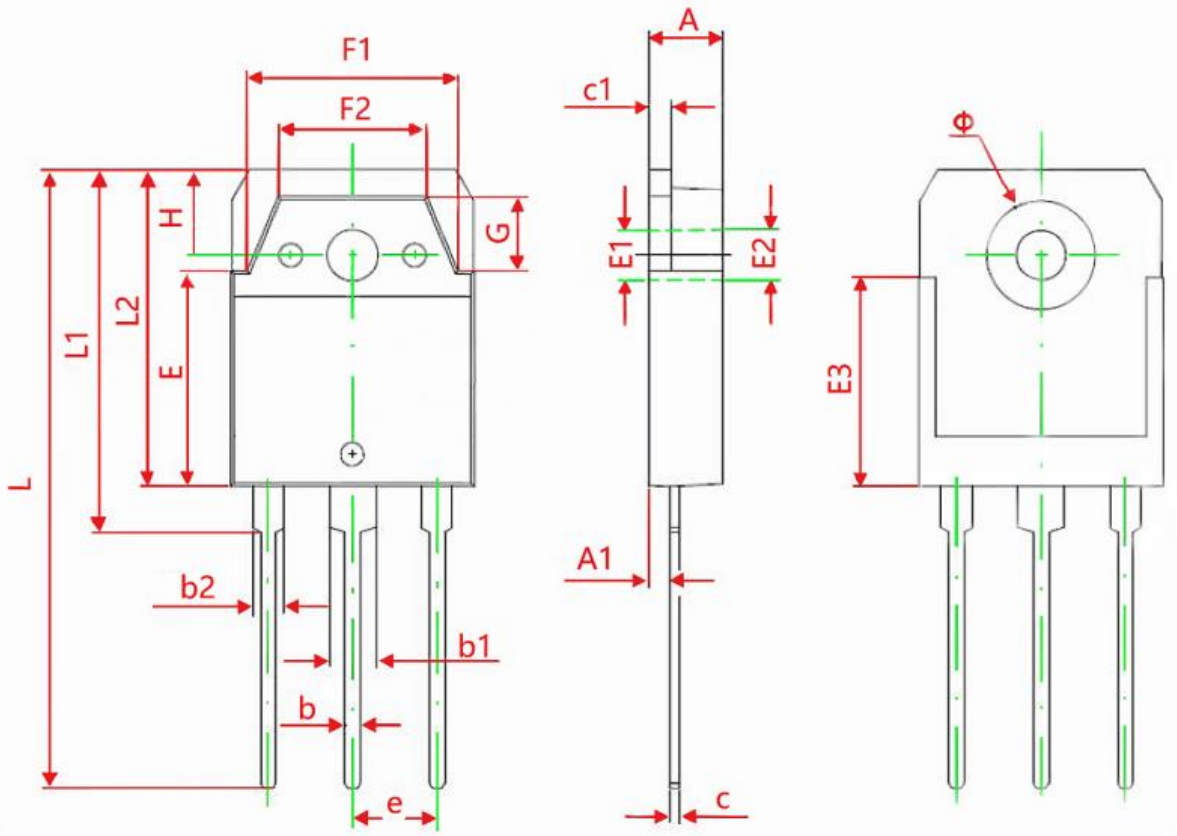


Figure 23. Safe operating area

TO-3P Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	4.600	5.000	0.181	0.196
A1	2.300	2.500	0.090	0.098
b	0.800	1.200	0.031	0.047
b1	2.800	3.200	0.110	0.125
b2	1.800	2.200	0.070	0.086
c	0.500	0.700	0.019	0.027
c1	1.450	1.650	0.057	0.064
D	15.450	15.850	0.608	0.624
E	13.700	14.100	0.539	0.555
E1	3.200REF		0.126REF	
E2	3.300REF		0.130REF	
E3	13.450REF		0.530REF	
F1	13.200	13.400	0.519	0.527
F2	9.400	9.800	0.370	0.385
L	39.780	39.980	1.566	1.574
L1	23.200	23.600	0.913	0.929
L2	19.780	19.980	0.778	0.786
Φ	6.900	7.100	0.271	0.279
G	5.150	5.550	0.203	0.219
e	5.450 TYP		0.215TYP	
H	5.000REF		0.197REF	
h	0.000	0.300	0.000	0.011

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