Features

- Low switching losses,High ruggedness, temperature stable
- Maximum Junction Temperature 175℃
- Positive Temperature Coefficient
- Moisture Sensitivity Level 1
- High short circuit capability(5us)
- Halogen Free. “Green” Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note 2)("P" Suffix Designates RoHS Compliant. See Ordering Information)

Trench and Field Stop IGBT 650V 30A

Applications

- Soft Switching Applications
- Air Conditioning
- Motor Drive Inverter

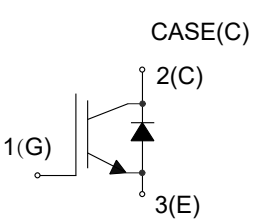
Maximum Ratings

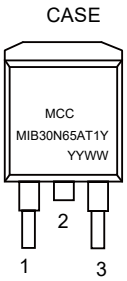
Parameter		Symbol	Rating	Unit
Collector-Emitter Voltage		V_{CE}	650	V
DC Collector Current(3)	T_C=25°C	I_C	40	A
	T_C=100°C		30	
Pulsed Collector Current (4) ,V_{GE}=15V		$I_{C,pluse}$	60	A
Diode Forward Current (3)	T_C=25°C	I_F	40	A
	T_C=100°C		30	
Diode Pulsed Current (4)		$I_{F,pluse}$	60	A
Continuous Gate-Emitter Voltage		V_{GE}	±20	V
Transient Gate-Emitter Voltage(5)			±30	
Turn off Safe Operation Area,T_j≤ 150°C V_{CE}≤650V			60	A
Short Circuit Withstand Time(6)		T_{SC}	5	μs
Power Dissipation, T_C=25°C, T_j=175°C		P_D	136	W

Note:

1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.
3. Limited by T_{Jmax}.
4. t_p limited by T_{Jmax}.
5. t_p≤10us, Duty Cycle<1%
6. V_{GE}=15V, V_{CEM}≤650V,V_{cc}=400V

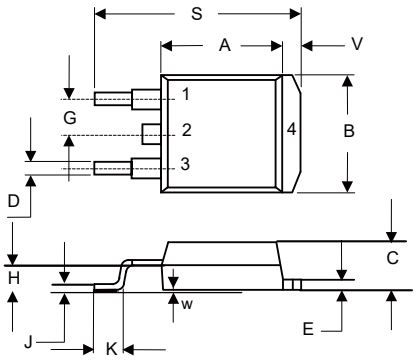
Internal Structure





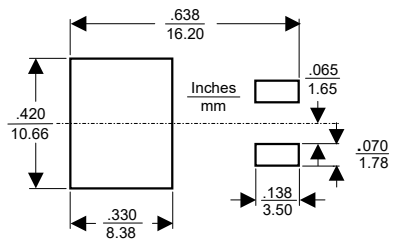
Device Code: MIB30N65AT1Y
Date Code: YYWW (Year & Week)

D2-PAK



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.331	0.370	8.40	9.40	
B	0.378	0.417	9.60	10.60	
C	0.165	0.189	4.20	4.80	
D	0.027	0.037	0.68	0.94	
E	0.045	0.055	1.14	1.40	
G	0.010		2.54		TYP.
H	0.096	0.134	2.43	3.40	
J	0.011	0.025	0.28	0.64	
K	0.071	0.131	1.80	3.32	
S	0.575	0.625	14.60	15.87	
V	0.042	0.058	1.07	1.47	
W	0.000	0.010	0.00	0.25	

Suggested Solder Pad Layout



Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
IGBT Static Characteristics						
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=250μA	650			V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=30A, T_j=25°C		1.65	1.95	V
		V_{GE}=15V, I_C=30A, T_j=125°C		2.00		
		V_{GE}=15V, I_C=30A, T_j=150°C		2.1		
G-E Threshold Voltage	$V_{GE(th)}$	I_C=1mA, V_{CE}=V_{GE}	4.7	5.5	6.2	V
C-E Leakage Current	I_{CES}	V_{CE}=650V, V_{GE}=0V, T_j=25°C			0.25	mA
		V_{CE}=650V, V_{GE}=0V, T_j=150°C			4	
G-E Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}=±20V			100	nA
Dynamic Characteristics						
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V,f=1MHz		1.53		nF
Reverse Transfer Capacitance	C_{res}			0.04		
Gate Charge	Q_G	V_{CC}=480V,I_C=30A,V_{GE}=15V		0.16		μC
Short Circuit Collector Current	I_{SC}	V_{GE}=15V, t_{sc}≤5us, V_{cc}=400V,T_j≤150°C		130		A
IGBT Switching Characteristics						
Turn-On Delay Time	$td_{(on)}$	V_{CC}=400V, I_C=30A, V_{GE}=-5V~15V, R_G=20Ω,T_j=25°C		58		ns
Rise Time	t_r			76		
Turn-Off Delay Time	$td_{(off)}$			93		
Fall Time	t_f			88		
Turn-On Energy	E_{on}			1.37		mJ
Turn-Off Energy	E_{off}			0.63		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=400V, I_C=30A V_{GE}=-5V~15V, R_G=20Ω,T_j=125°C		56		ns
Rise Time	t_r			77		
Turn-Off Delay Time	$td_{(off)}$			99		
Fall Time	t_f			116		
Turn-On Energy	E_{on}			1.42		mJ
Turn-Off Energy	E_{off}			0.79		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=400V, I_C=30A V_{GE}=-5V~15V, R_G=20Ω,T_j=150°C		54		ns
Rise Time	t_r			77		
Turn-Off Delay Time	$td_{(off)}$			102		
Fall Time	t_f			128		
Turn-On Energy	E_{on}			1.45		mJ
Turn-Off Energy	E_{off}			0.85		

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Characteristics						
Diode Forward Voltage	V_F	V_{GE}=0V, I_F=30A, T_j=25°C		1.6	2.0	V
		V_{GE}=0V, I_F=30A, T_j=125°C		1.55		
		V_{GE}=0V, I_F=30A, T_j=150°C		1.5		
Reverse Recovery Current	I_{rr}	V_R=400V, I_F=30A, di_F/dt=-320A/μs, T_j=25°C		11		A
Diode Reverse Recovery Time	t_{rr}			114		ns
Reverse Recovery Charge	Q_{rr}			0.75		μC
Reverse Recovery Energy	E_{rec}			0.14		mJ
Reverse Recovery Current	I_{rr}	V_R=400V, I_F=30A, di_F/dt=-320A/μs, T_j=125°C		14		A
Diode Reverse Recovery Time	t_{rr}			156		ns
Reverse Recovery Charge	Q_{rr}			1.14		μC
Reverse Recovery Energy	E_{rec}			0.27		mJ
Reverse Recovery Current	I_{rr}	V_R=400V, I_F=30A, di_F/dt=-320A/μs, T_j=150°C		16		A
Diode Reverse Recovery Time	t_{rr}			177		ns
Reverse Recovery Charge	Q_{rr}			1.59		μC
Reverse Recovery Energy	E_{rec}			0.34		mJ

Thermal characteristics

Parameter	Symbol	Min	Typ	Max	Units
Operating Junction Temperature Range	T_J	-40		175	°C
Storage Temperature Range	T_{stg}	-55		150	°C
Thermal Resistance from Junction to Case (IGBT)	Rth_{J-C}			1.1	°C/W
Thermal Resistance from Junction to Case (Diode)	Rth_{J-C}			1.8	°C/W
Thermal Resistance from Junction to Ambient	Rth_{J-A}			40	°C/W

Curve Characteristics

Fig. 1 - Typical Output Characteristic(T_j=25°C)

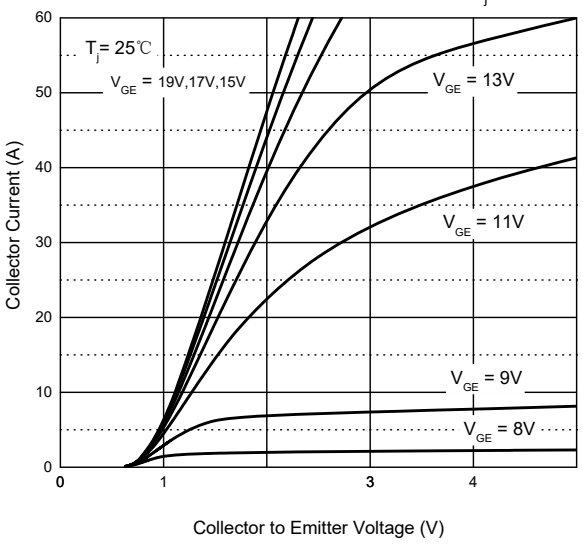


Fig. 2 - Typical Output Characteristic (T_j=150°C)

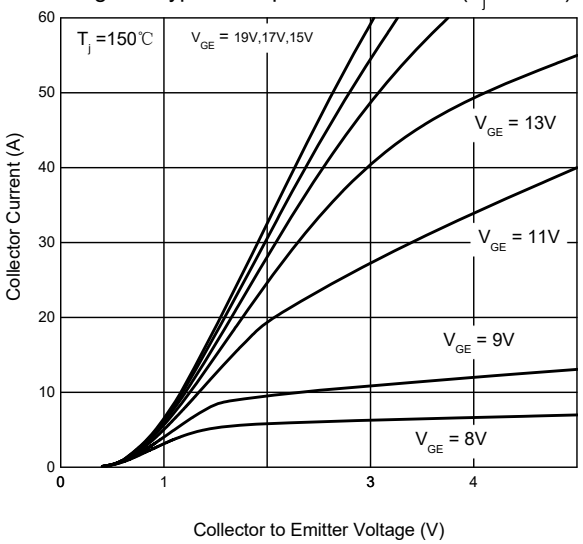


Fig. 3 - Typical Transfer Characteristic

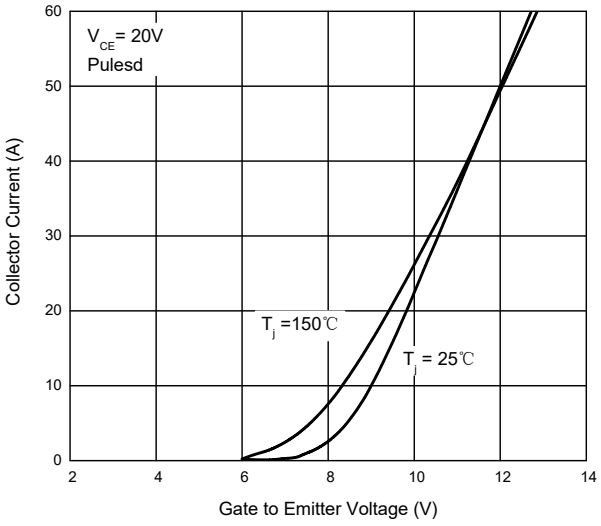


Fig. 4 - Diode Forward Current vs. Forward Voltage

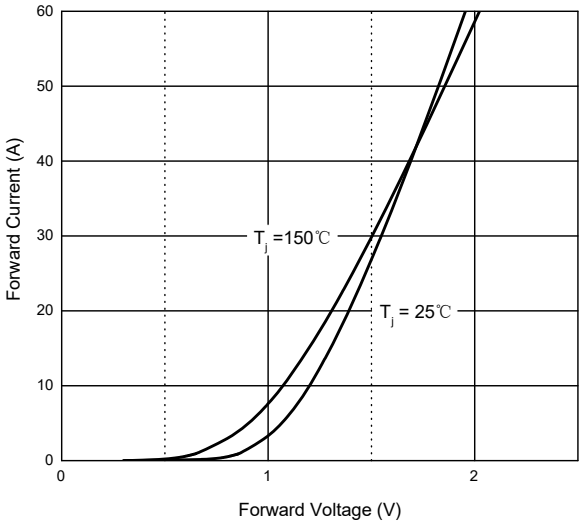


Fig. 5 - Diode VF vs. Junction Temperature

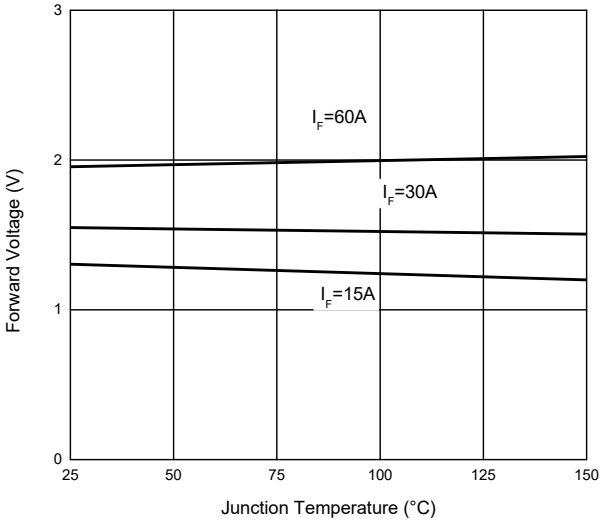
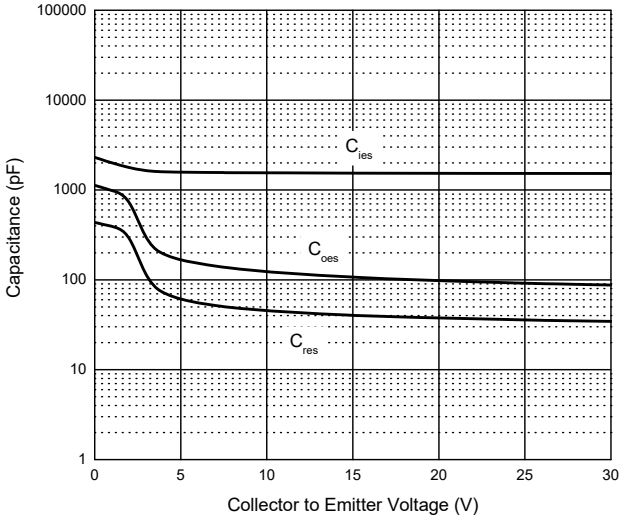


Fig. 6 - Capacitance Characteristics



Curve Characteristics

Fig. 7 - IGBT Switching Loss vs. IC

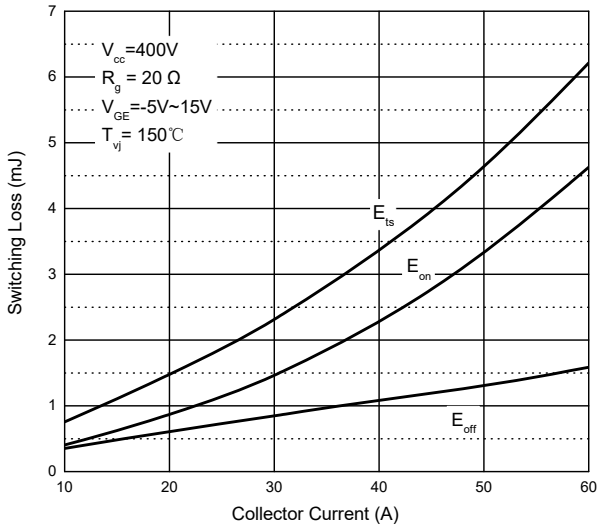


Fig. 8- IGBT Switching Loss vs. R_g

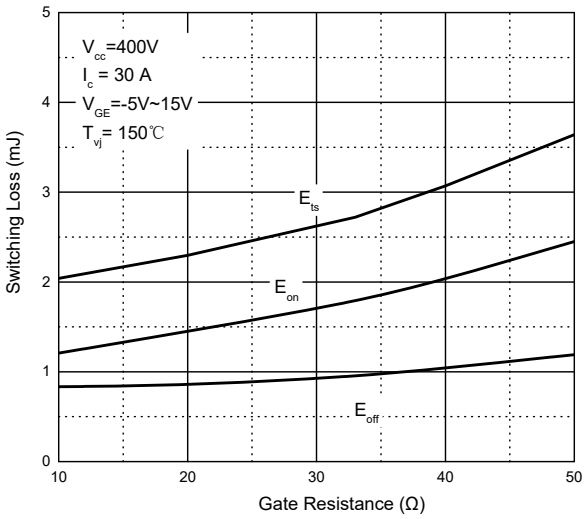


Fig. 9 -IGBT Switching Loss vs. Junction Temperature

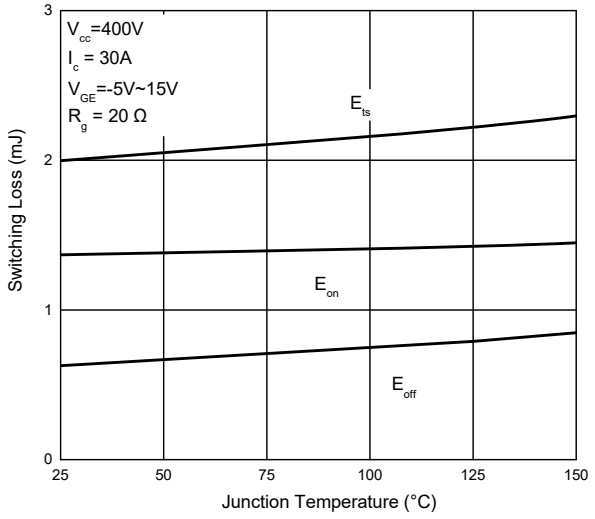


Fig. 10 - Switching Loss vs. VCE

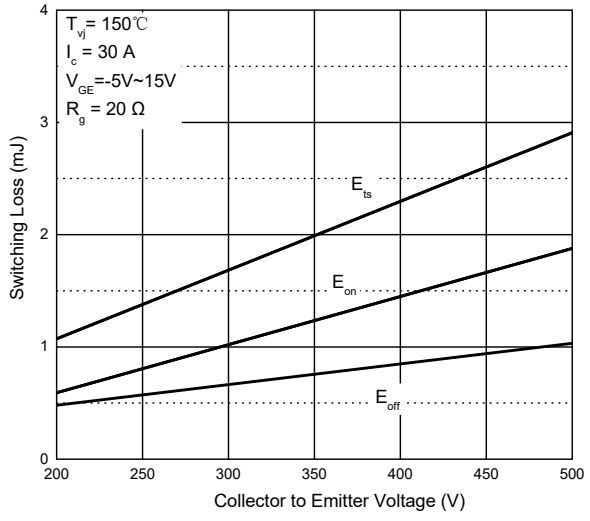


Fig. 11 - $V_{CE(sat)}$ vs. Junction Temperature

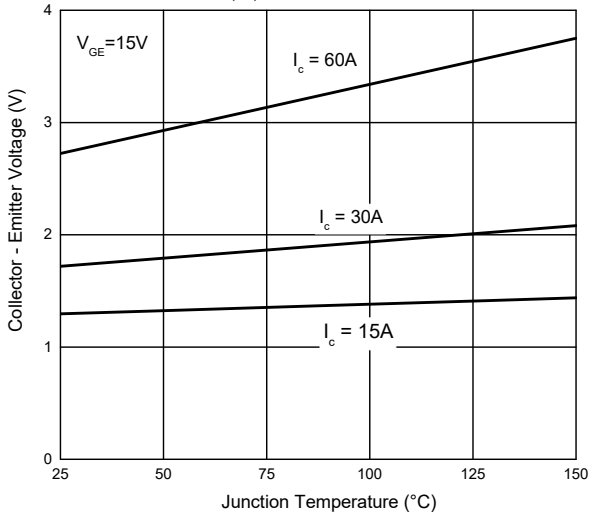
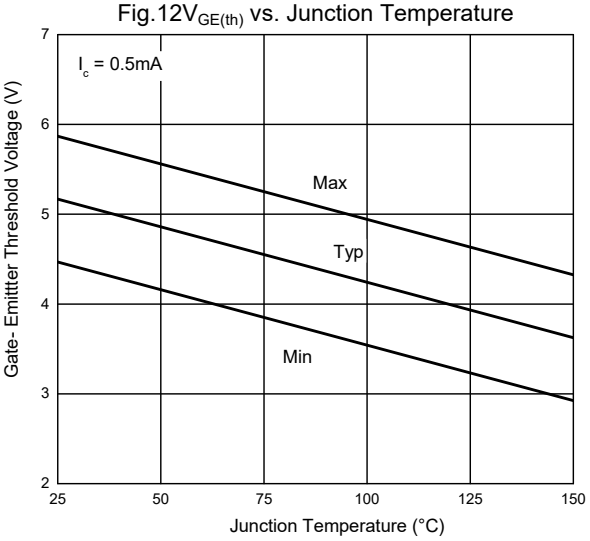


Fig.12$V_{GE(th)}$ vs. Junction Temperature



Curve Characteristics

Fig. 13 - Switching Time vs. Collect Current

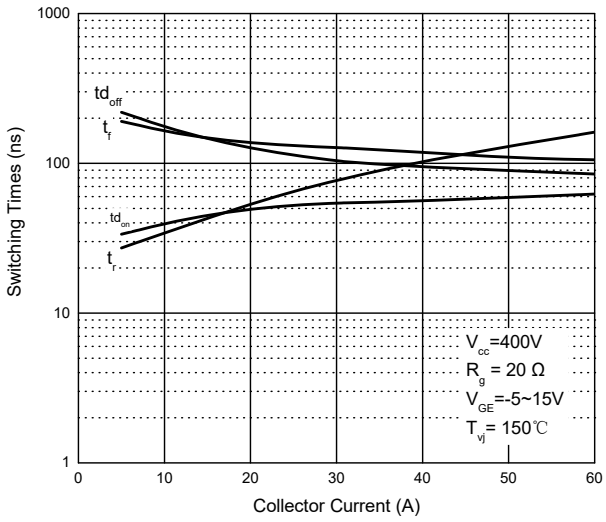


Fig. 14 - Switching Time vs. Gate Resistance

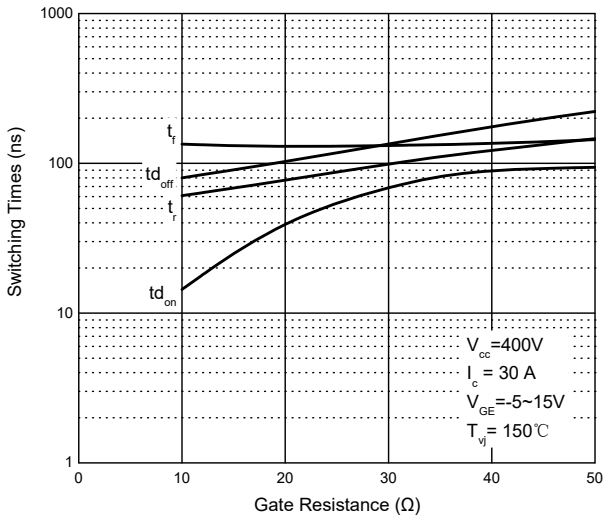


Fig. 15 - Switching Time vs. Junction Temperature

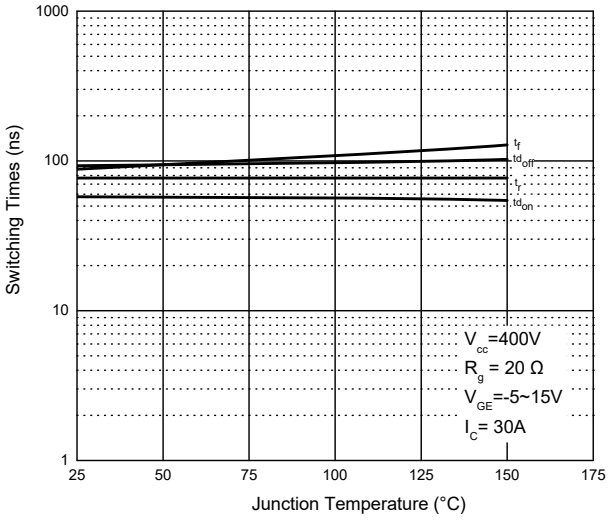


Fig. 16 - IGBT Transient Thermal Impedance

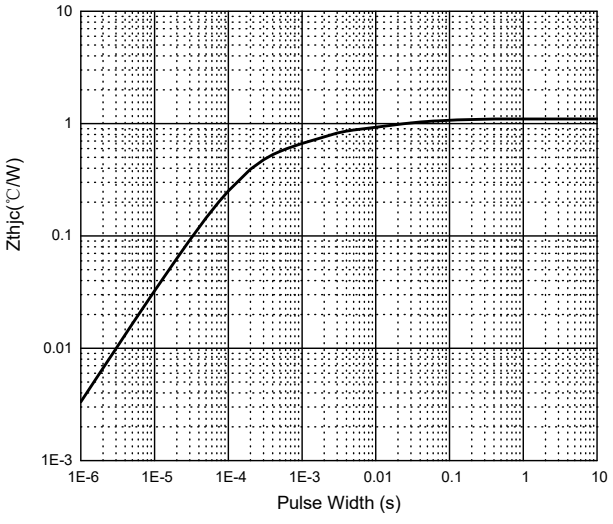


Fig. 17 - Diode Transient Thermal Impedance

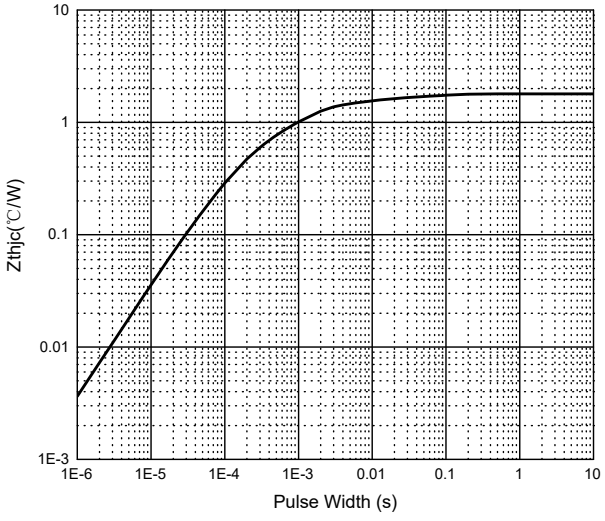
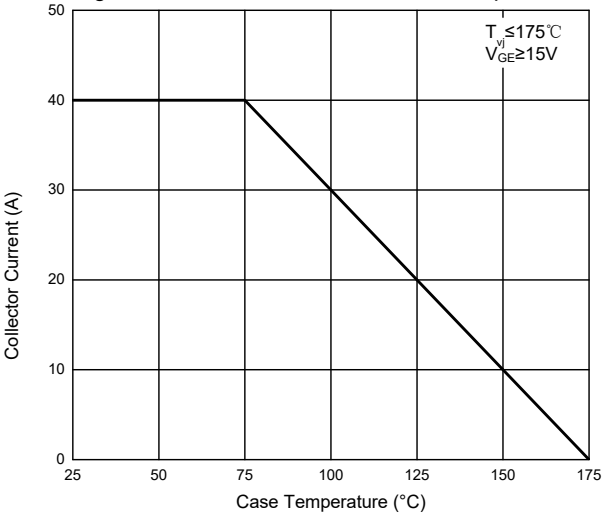
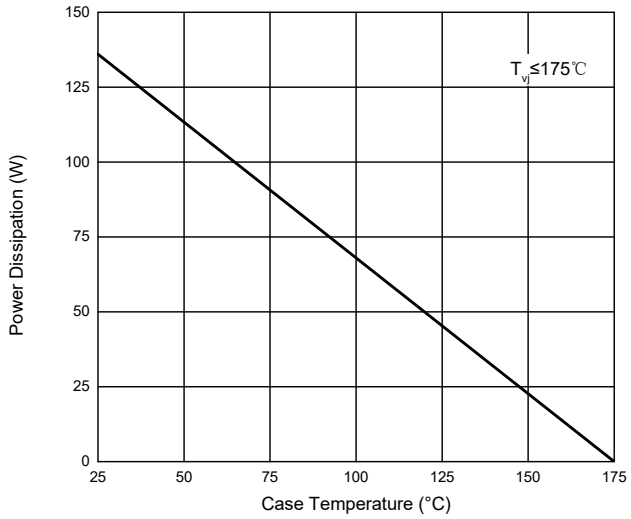


Fig. 18 - Collector Current vs. Case Temperature



Curve Characteristics

Fig. 19 - Power Derating



Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 800pcs/Reel