Trench and Field Stop IGBT 650V 50A

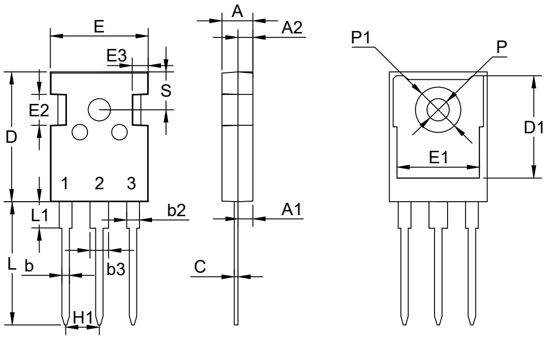
Features

- High Speed Smooth Switching Device for Hard & Soft Switching
- Positive Temperature Coefficient
- High Ruggedness ,Temperature Stable
- Maximum junction temperature 175℃
- 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)

Applications

- Solar converters
- Uninterruptible power supplies
- Mid to high range switching frequency converters
- Welding Converters

TO-247AB



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.189	0.205	4.80	5.20	
A1	0.087	0.103	2.21	2.61	
A2	0.073	0.085	1.85	2.15	
b	0.039	0.055	1.00	1.40	
b2	0.075	0.087	1.91	2.21	
C	0.020	0.028	0.50	0.70	
D	0.815	0.839	20.70	21.30	
D1	0.640	0.663	16.25	16.85	
E	0.610	0.634	15.50	16.10	
E1	0.512	0.535	13.00	13.60	
E2	0.189	0.205	4.80	5.20	
E3	0.091	0.106	2.30	2.70	
L	0.772	0.796	19.62	20.22	
L1	-	0.169	-	4.30	
P	0.134	0.150	3.40	3.80	Φ
P1		0.287	-	7.30	Φ
S	0.242		6.15		TYP
H1	0.214		5.44		TYP
b3	0.110	0.126	2.80	3.20	

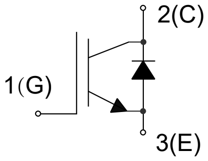
Maximum Ratings

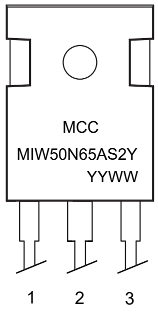
Parameter		Symbol	Rating	Unit
Collector-Emitter Voltage		V_{CE}	650	V
DC Collector Current$^{(Note\ 3)}$	T_C=25°C	I_C	80$^{(Note\ 4)}$	A
	T_C=100°C		60	
Pulsed Collector Current,V_{GE}=15V$^{(Note\ 5)}$		$I_{C,pluse}$	200	A
Diode Forward Current $^{(Note\ 3)}$	T_C=25°C	I_F	80$^{(Note\ 4)}$	A
	T_C=100°C		60	
Diode Pulsed Current $^{(Note\ 5)}$		$I_{F,pluse}$	200	A
Gate-Emitter Voltage		V_{GE}	±20	V
Transient Gate-Emitter Voltage$^{(Note\ 6)}$			±30	
Power Dissipation	T_C=25°C	P_D	283	W
	T_C=100°C		141.5	

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. Value limited by bondwire.
5. T_p limited by T_{jmax}.
6. T_p≤10us, Duty Cycle<1%

Internal Structure





Device Code: MIW50N65AS2Y

Date Code: YYWW (Year & Week)

Electrical Characteristics of the IGBT @ T_j=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=50A, T_j=25℃	1.10	1.40	1.70	V
		V_{GE}=15V, I_C=50A, T_j=125℃		1.60		
		V_{GE}=15V, I_C=50A, T_j=150℃		1.70		
G-E Threshold Voltage	$V_{GE(th)}$	I_C=0.50mA, V_{CE}=V_{GE}	3.0	4.0	5.0	V
C-E Leakage Current	I_{CES}	V_{CE}=650V, V_{GE}=0V, T_j=25℃			0.25	mA
		V_{CE}=650V, V_{GE}=0V, T_j=150℃			3	
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		2.86		nF
Reverse Transfer Capacitance	C_{res}			0.02		
Gate Charge	Q_g	V_{CC}=520V,I_C=50A,V_{GE}=15V		0.14		μC
IGBT Switching Characteristics						
Turn-On Delay Time	$td_{(on)}$	V_{CC}=400V, I_C=50A, V_{GE}=-5V~15V, R_G=10Ω,T_j=25℃ Inductive Load		23		ns
Rise Time	t_r			31		
Turn-Off Delay Time	$td_{(off)}$			83		
Fall Time	t_f			49		
Turn-On Energy	E_{on}			1.89		mJ
Turn-Off Energy	E_{off}			0.55		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=400V, I_C=50A, V_{GE}=-5V~15V, R_G=10Ω,T_j=125℃ Inductive Load		24		ns
Rise Time	t_r			38		
Turn-Off Delay Time	$td_{(off)}$			90		
Fall Time	t_f			62		
Turn-On Energy	E_{on}			1.93		mJ
Turn-Off Energy	E_{off}			0.76		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=400V, I_C=50A, V_{GE}=-5V~15V, R_G=10Ω,T_j=150℃ Inductive Load		25		ns
Rise Time	t_r			42		
Turn-Off Delay Time	$td_{(off)}$			95		
Fall Time	t_f			70		
Turn-On Energy	E_{on}			1.99		mJ
Turn-Off Energy	E_{off}			0.81		

Electrical Characteristics of the Diode @ T_j=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=50A, T_j=25℃		1.60	2.00	V
		V_{GE}=0V, I_F=50A, T_j=125℃		1.50		
		V_{GE}=0V, I_F=50A, T_j=150℃		1.40		
Reverse Recovery Current	I_{rr}	V_R=400V, I_F=50A, di_F/dt=-450A/μs, T_j=25℃		15		A
Diode Reverse Recovery Time	t_{rr}			148		ns
Reverse Recovery Charge	Q_{rr}			1.58		μC
Reverse Recovery Energy	E_{rec}			0.29		mJ
Reverse Recovery Current	I_{rr}	V_R=400V, I_F=50A, di_F/dt=-450A/μs, T_j=125℃		21		A
Diode Reverse Recovery Time	t_{rr}			183		ns
Reverse Recovery Charge	Q_{rr}			2.54		μC
Reverse Recovery Energy	E_{rec}			0.65		mJ
Reverse Recovery Current	I_{rr}	V_R=400V, I_F=50A, di_F/dt=-450A/μs, T_j=150℃		24		A
Diode Reverse Recovery Time	t_{rr}			218		ns
Reverse Recovery Charge	Q_{rr}			3.59		μC
Reverse Recovery Energy	E_{rec}			0.79		mJ

Thermal characteristics

Parameter	Symbol	Min	Typ	Max	Units
Operating Junction Temperature Range	T_j	-40		175	℃
Storage Temperature Range	T_{stg}	-55		150	℃
Thermal Resistance from Junction to Case (IGBT)	$Rth_{J\text{-}C}$			0.53	℃/W
Thermal Resistance from Junction to Case (Diode)	$Rth_{J\text{-}C}$			1.05	℃/W
Thermal Resistance from Junction to Ambient	$Rth_{J\text{-}A}$			40	℃/W

Curve Characteristics

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

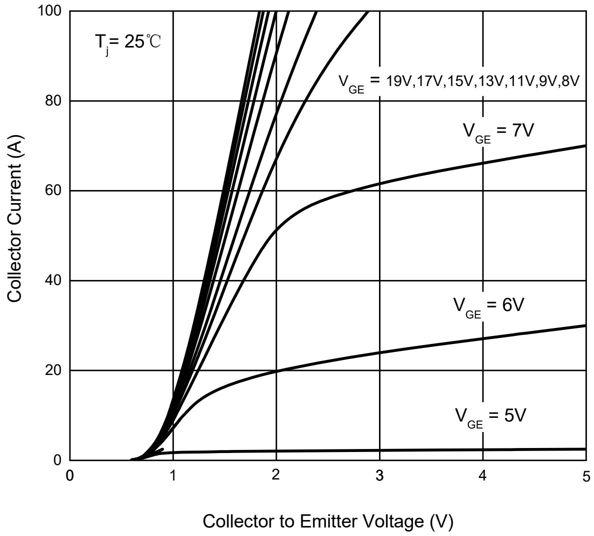


Fig. 2 - Typical Output Characteristic (T_j=150°C)

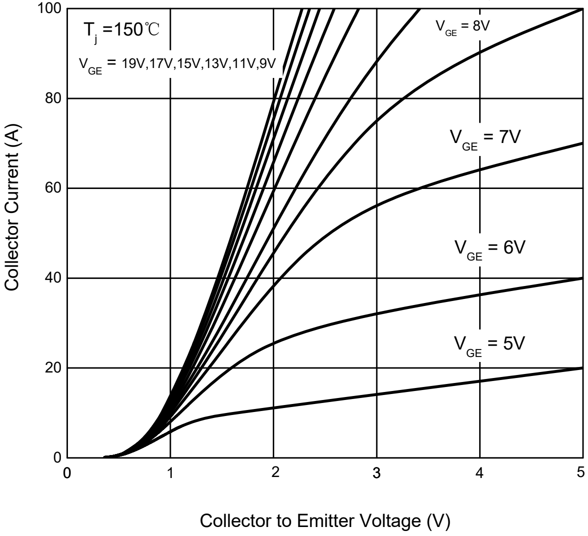


Fig. 3 - Typical Transfer Characteristic

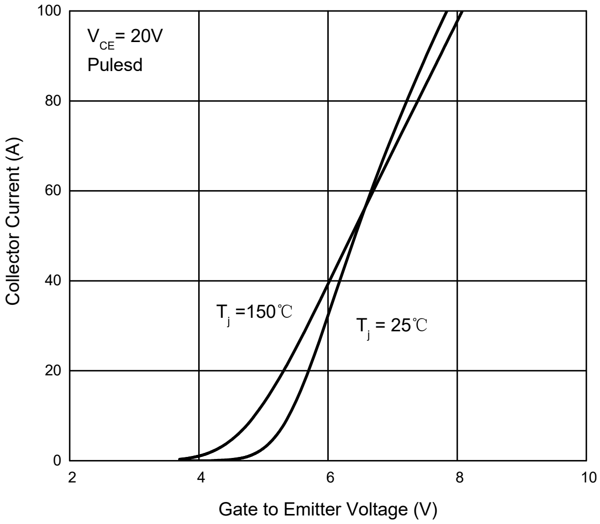


Fig. 4 - Diode Forward Current vs. Forward Voltage

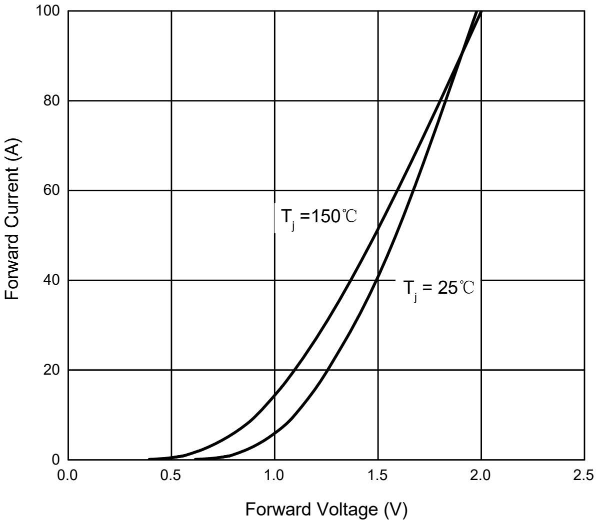


Fig. 5 - Diode VF vs. Junction Temperature

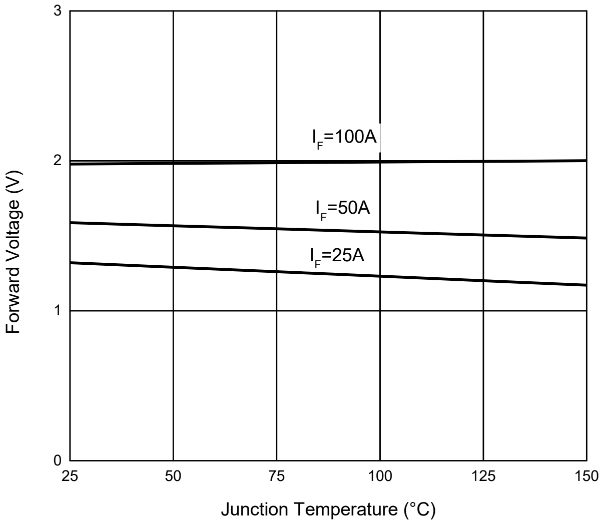
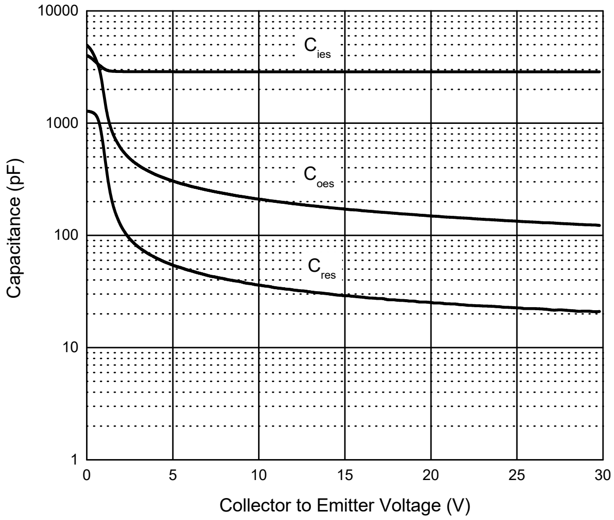


Fig. 6 - Capacitance Characteristics



Curve Characteristics

Fig. 7 - IGBT Switching Loss vs. I_C

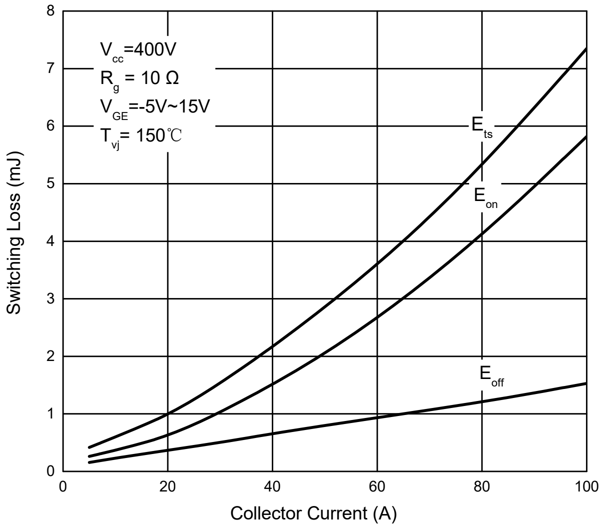


Fig. 8- IGBT Switching Loss vs. R_g

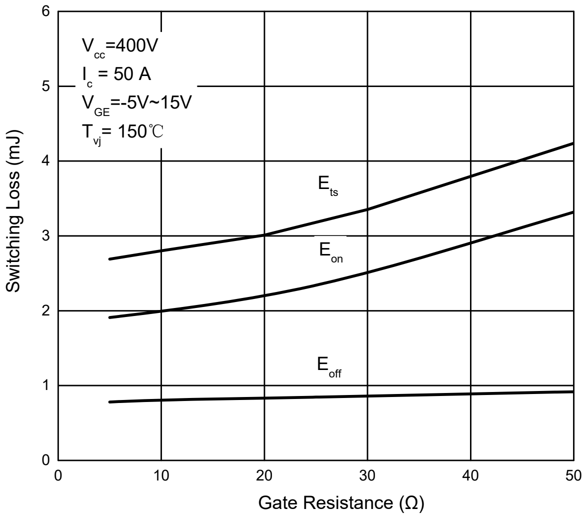


Fig. 9 -IGBT Switching Loss vs. Junction Temperature

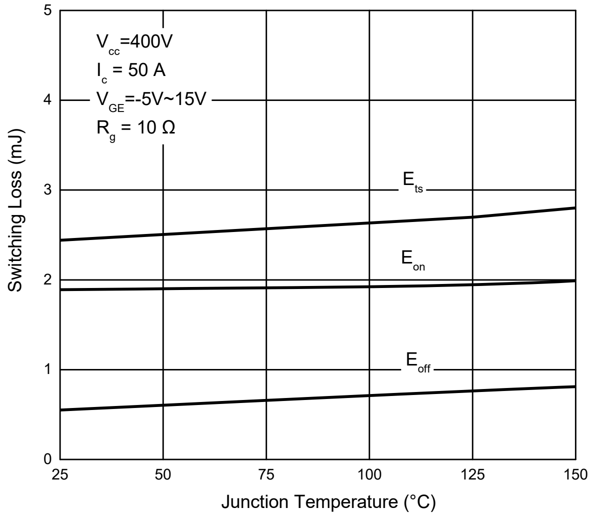


Fig. 10 -IGBT Switching Loss vs. V_{CE}

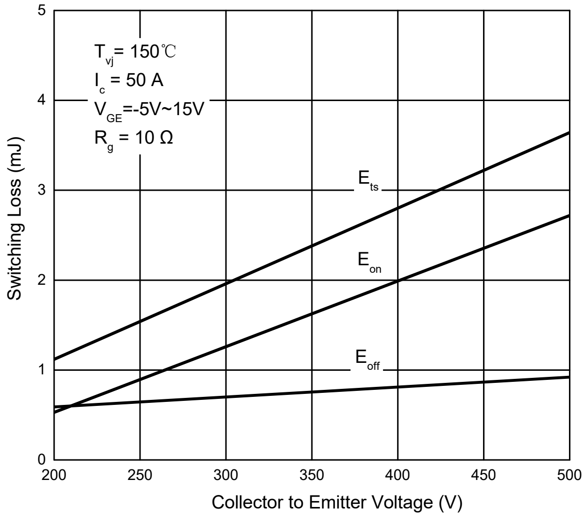


Fig. 11 - $V_{CE(sat)}$ vs. Junction Temperature

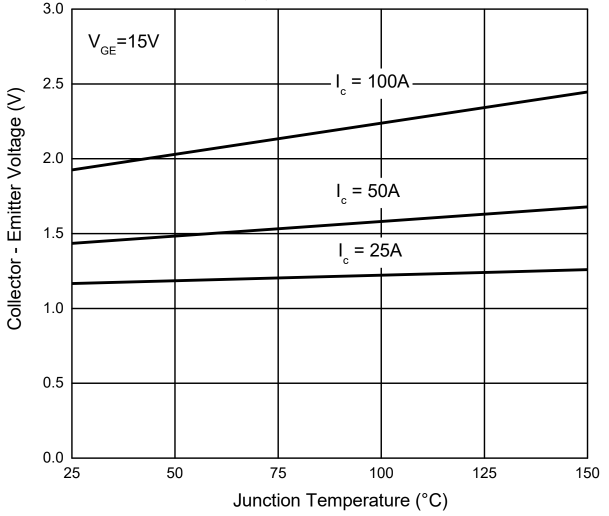
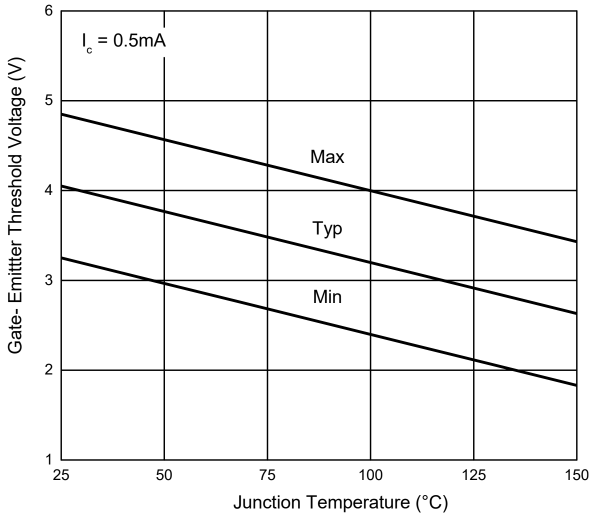


Fig. 12-$V_{GE(th)}$ vs. Junction Temperature



Curve Characteristics

Fig. 13 - Switching Times vs. Collect Current

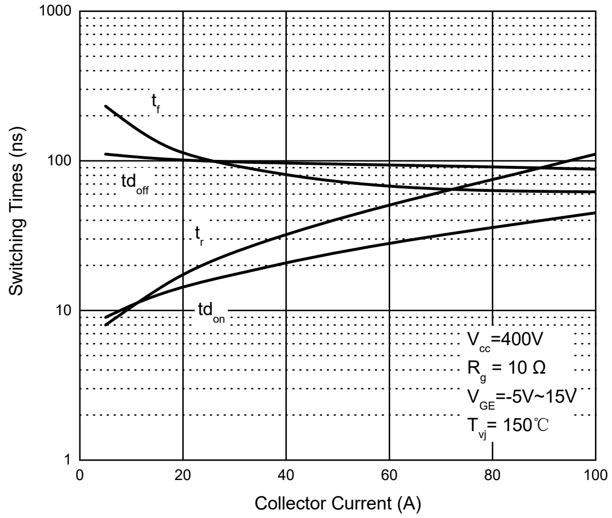


Fig. 14 - Switching Times vs. Gate Resistance

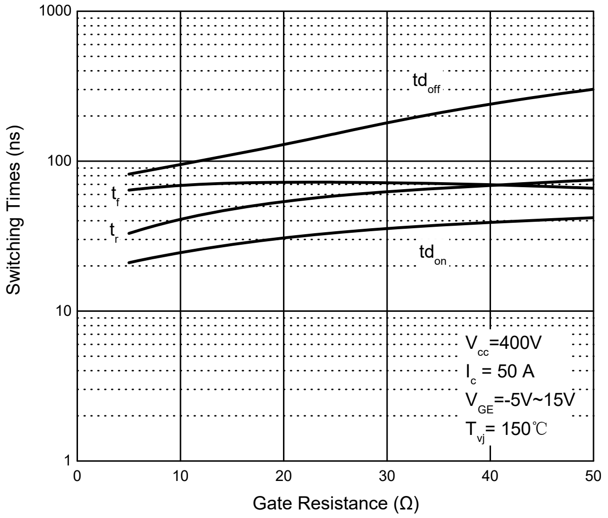


Fig. 15 - IGBT Transient Thermal Impedance

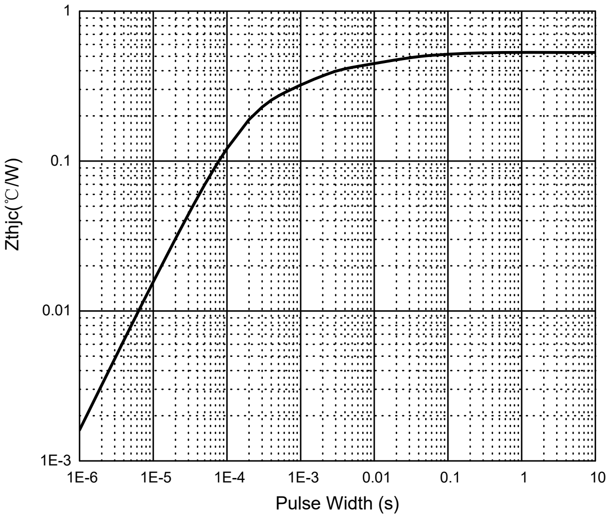


Fig. 16 - Diode Transient Thermal Impedance

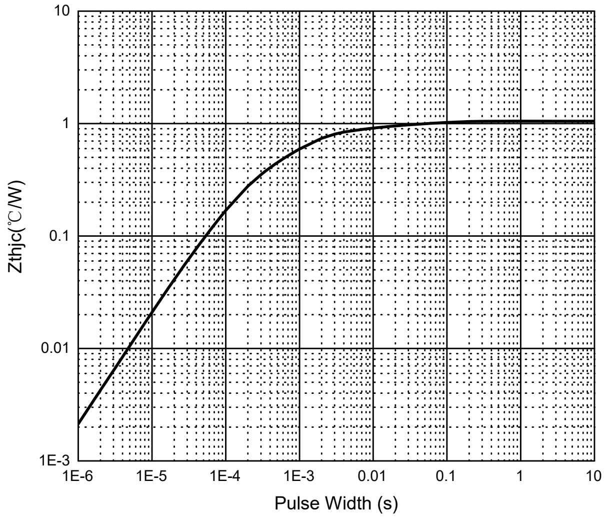


Fig. 17 - Collector Current vs. Case Temperature

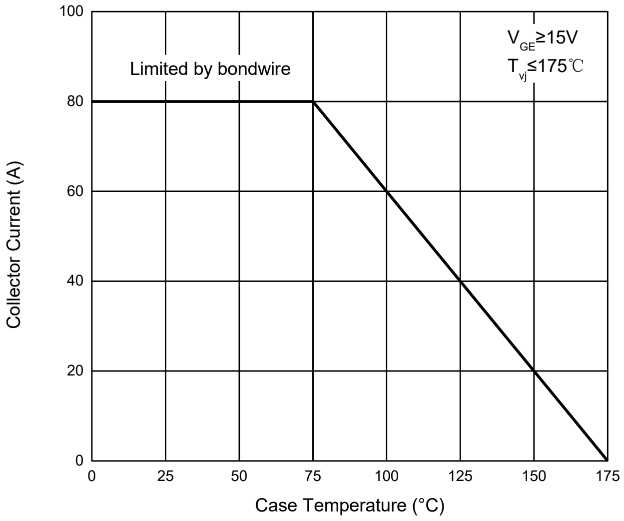
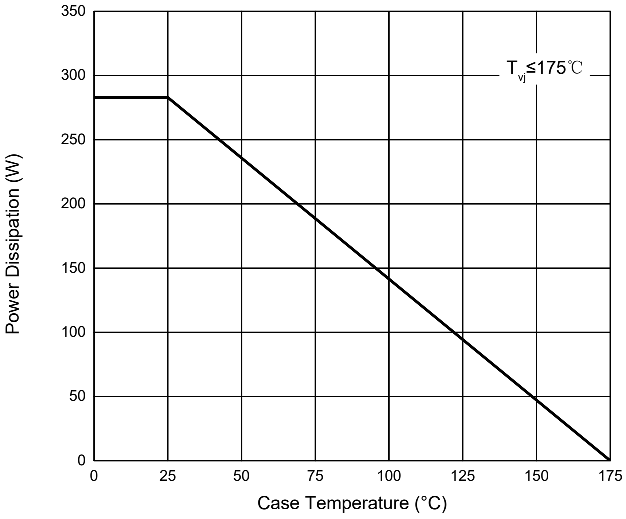
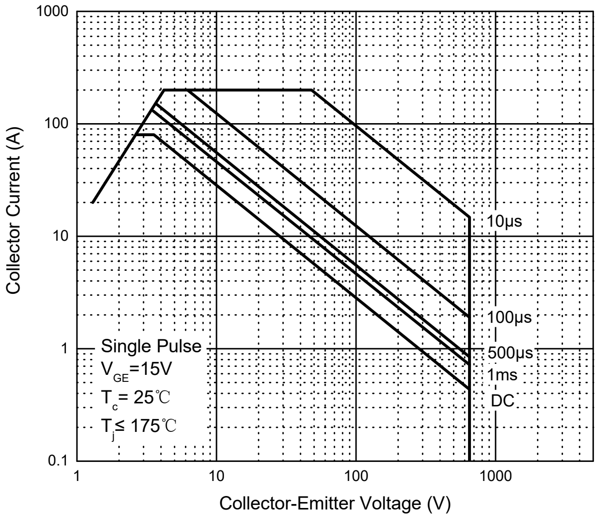


Fig. 18 - Power Derating



Curve Characteristics

Fig. 19 -FBSOA



Ordering Information

Device	Packing
Part Number-BP	Tube: 30pcs/Tube, 1800pcs/Ctn

*****IMPORTANT NOTICE*****

Micro Commercial Components Corp. reserves the right to make changes without further notice to any product herein to make corrections, modifications , enhancements , improvements , or other changes . ***Micro Commercial Components Corp*** . does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights ,nor the rights of others . The user of products in such applications shall assume all risks of such use and will agree to hold ***Micro Commercial Components Corp*** . and all the companies whose products are represented on our website, harmless against all damages. ***Micro Commercial Components Corp***. products are sold subject to the general terms and conditions of commercial sale, as published at
https://www.mccsemi.com/Home/TermsAndConditions.

*****LIFE SUPPORT*****

MCC's products are not authorized for use as critical components in life support devices or systems without the express written approval of Micro Commercial Components Corporation.

*****CUSTOMER AWARENESS*****

Counterfeiting of semiconductor parts is a growing problem in the industry. Micro Commercial Components (MCC) is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. MCC strongly encourages customers to purchase MCC parts either directly from MCC or from Authorized MCC Distributors who are listed by country on our web page cited below. Products customers buy either from MCC directly or from Authorized MCC Distributors are genuine parts, have full traceability, meet MCC's quality standards for handling and storage. **MCC will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources**. MCC is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.