

Features

- High Breakdown Voltage to 1200V for Improved Reliability
- Maximum Junction Temperature 175°C
- Positive Temperature Coefficient
- Including SiC FWD
- 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

- Resonant converters
- Uninterruptible power supplies
- Mid to high range switching frequency

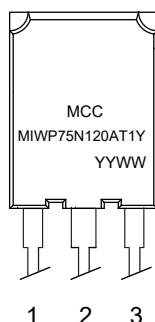
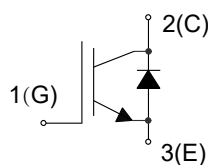
Maximum Ratings

Parameter	Symbol	Rating	Unit
Collector-Emitter Voltage	V_{CE}	1200	V
DC Collector Current ⁽³⁾	I_C	$T_C=25^\circ\text{C}$ 150	A
		$T_C=100^\circ\text{C}$ 75	
Pulsed Collector Current ⁽⁴⁾ , $V_{GE}=15\text{V}$	$I_{C,pluse}$	300	A
Diode Forward Current ⁽³⁾	I_F	$T_C=25^\circ\text{C}$ 150	A
		$T_C=100^\circ\text{C}$ 75	
Diode Pulsed Current ⁽⁴⁾	$I_{F,pluse}$	300	A
Continuous Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage ⁽⁵⁾		± 30	
Turn off Safe Operation Area $V_{CE} \leq 1200\text{V}$, $T_j \leq 150^\circ\text{C}$		300	A
Power Dissipation	P_D	$T_C=25^\circ\text{C}$ 645	W
		$T_j=175^\circ\text{C}$	

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. $t_p \leq 10\mu\text{s}$, Duty Cycle < 1%

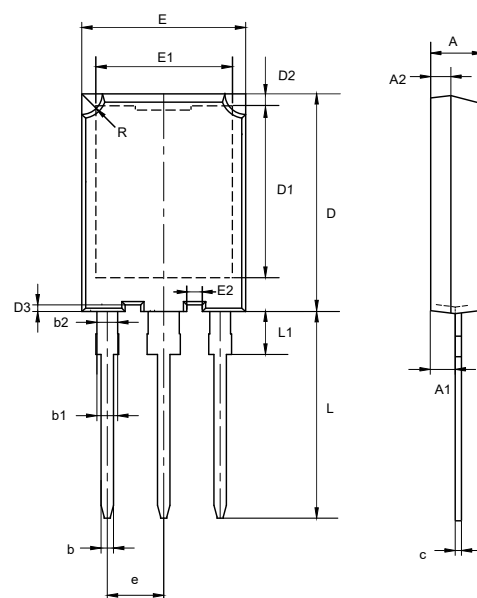
Internal Structure



Device Code: MIWP75N120AT1Y
Date Code: YYWW (Year & Week)

Trench and Field Stop IGBT 1200V 75A

TO-247Plus



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.192	0.201	4.90	5.10	
A1	0.090	0.099	2.31	2.51	
A2	0.074	0.083	1.90	2.10	
b	0.044	0.050	1.14	1.26	
b1	0.073	0.085	1.86	2.16	
b2	0.077	0.081	1.96	2.06	
c	0.022	0.026	0.58	0.64	
D	0.822	0.831	20.90	21.10	
D1	0.639	0.664	16.25	16.85	
D2	0.041	0.054	1.05	1.35	
D3	0.022	0.031	0.58	0.78	
E	0.618	0.626	15.70	15.90	
E1	0.515	0.532	13.10	13.50	
E2	0.053	0.061	1.35	1.55	
e	0.214(BSC)		5.44(BSC)		
L	0.778	0.791	19.78	20.08	
L1	0.158	0.167	4.03	4.23	
R	0.074	0.083	1.90	2.10	

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
IGBT Static Characteristics						
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=250\mu A$	1200			V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A, T_J=25^\circ C$		1.55	1.9	V
		$V_{GE}=15V, I_C=75A, T_J=125^\circ C$		1.8		
		$V_{GE}=15V, I_C=75A, T_J=150^\circ C$		1.9		
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=2.6mA, V_{CE}=V_{GE}$	4.8	5.6	6.4	V
C-E Leakage Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_J=25^\circ C$			0.25	mA
		$V_{CE}=1200V, V_{GE}=0V, T_J=150^\circ C$			5	
G-E Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$			± 100	nA
Dynamic Characteristics						
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		6.92		nF
Reverse Transfer Capacitance	C_{res}			0.06		
Gate Charge	Q_G	$V_{CC}=600V, I_C=75A, V_{GE}=15V$		0.48		μC
Short Circuit Collector Current	I_{SC}	$V_{GE}=15V, t_{SC}\leq 10\mu s, V_{CC}=600V$		350		A
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=75A,$ $V_{GE}=-5V\sim 15V,$ $R_G=10\Omega, T_J=25^\circ C$		135		ns
Rise Time	t_r			106		
Turn-Off Delay Time	$t_{d(off)}$			345		
Fall Time	t_f			210		
Turn-On Energy	E_{on}	$V_{CC}=600V, I_C=75A$ $V_{GE}=-5V\sim 15V,$ $R_G=10\Omega, T_J=125^\circ C$		8.5		mJ
Turn-Off Energy	E_{off}			5.1		
Turn-On Delay Time	$t_{d(on)}$			135		ns
Rise Time	t_r			110		
Turn-Off Delay Time	$t_{d(off)}$			365		
Fall Time	t_f			315		
Turn-On Energy	E_{on}			10.5		mJ
Turn-Off Energy	E_{off}			7.0		
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=75A$ $V_{GE}=-5V\sim 15V,$ $R_G=10\Omega, T_J=150^\circ C$		135		ns
Rise Time	t_r			121		
Turn-Off Delay Time	$t_{d(off)}$			375		
Fall Time	t_f			345		
Turn-On Energy	E_{on}			10.8		mJ
Turn-Off Energy	E_{off}			7.5		

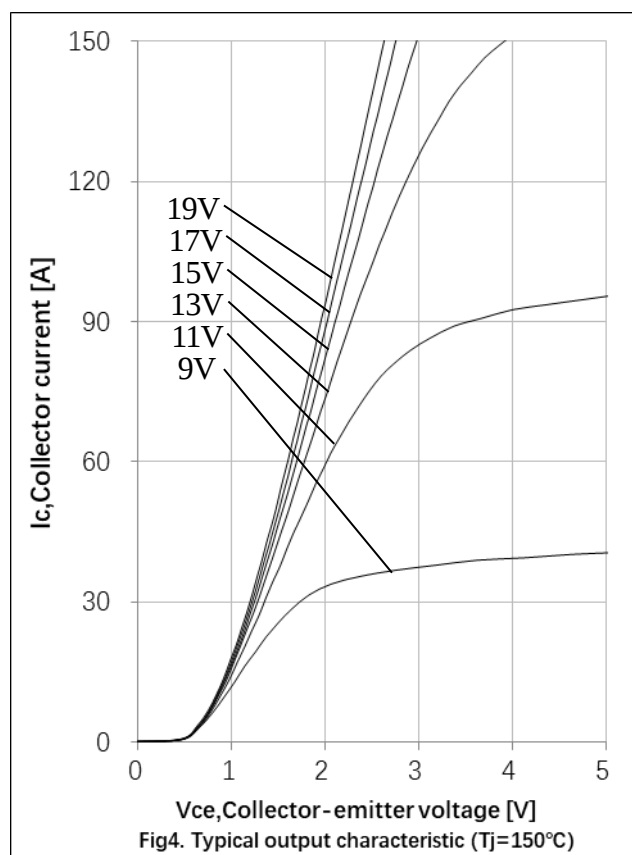
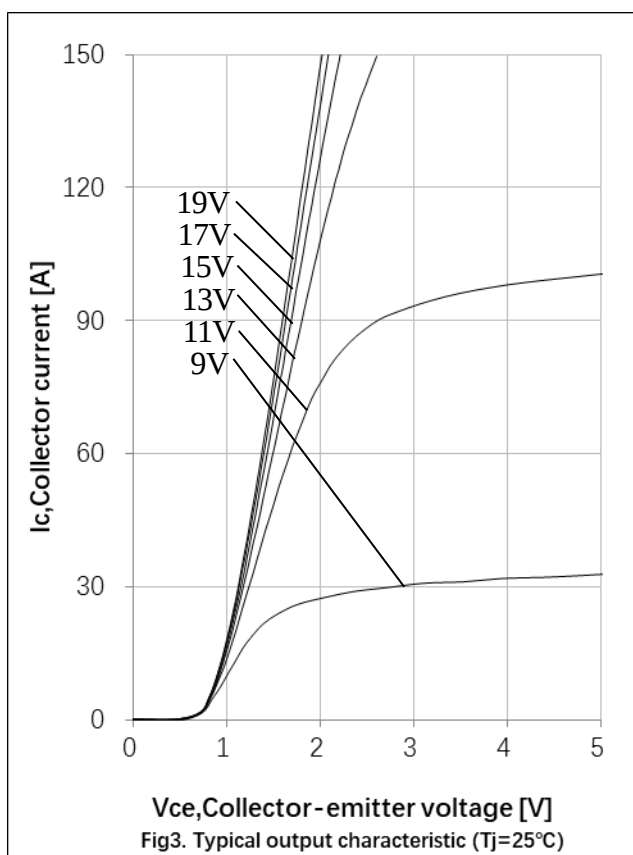
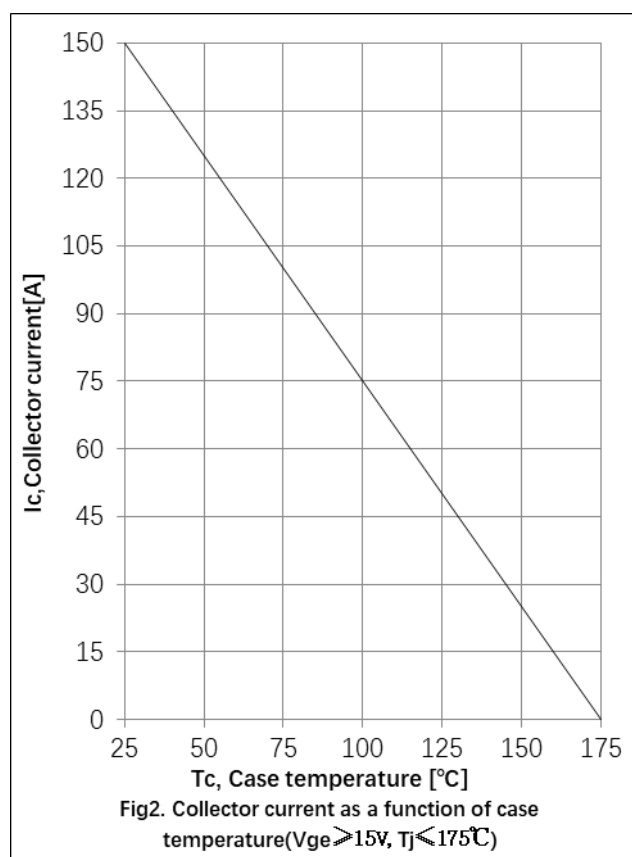
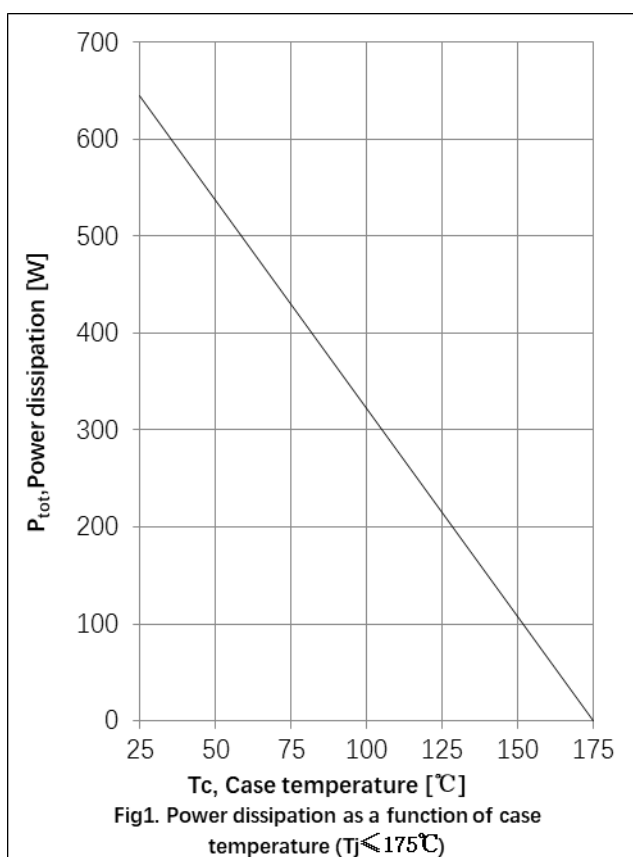
Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Characteristics						
Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=75A, T_j=25^{\circ}C$		2.0	2.6	V
		$V_{GE}=0V, I_F=75A, T_j=125^{\circ}C$		1.9		
		$V_{GE}=0V, I_F=75A, T_j=150^{\circ}C$		1.8		
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=75A,$ $di_F/dt=-500A/\mu s, T_j=25^{\circ}C$		9		A
Diode Reverse Recovery Time	t_{rr}			268		ns
Reverse Recovery Charge	Q_{rr}			3.42		μC
Reverse Recovery Energy	E_{rec}			1.52		mJ
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=75A,$ $di_F/dt=-500A/\mu s, T_j=125^{\circ}C$		12		A
Diode Reverse Recovery Time	t_{rr}			337		ns
Reverse Recovery Charge	Q_{rr}			6.58		μC
Reverse Recovery Energy	E_{rec}			3.18		mJ
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=75A,$ $di_F/dt=-500A/\mu s, T_j=150^{\circ}C$		14		A
Diode Reverse Recovery Time	t_{rr}			375		ns
Reverse Recovery Charge	Q_{rr}			9.45		μC
Reverse Recovery Energy	E_{rec}			3.73		mJ

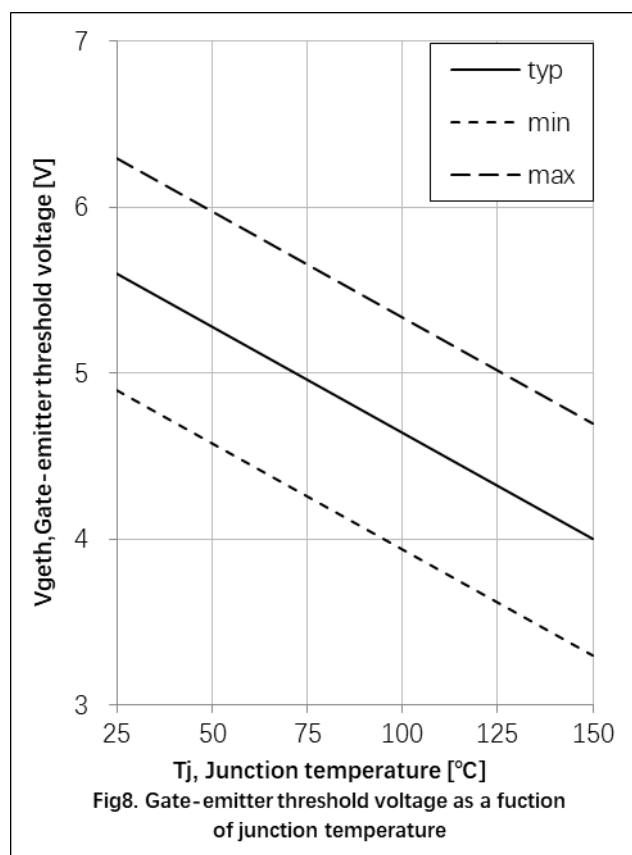
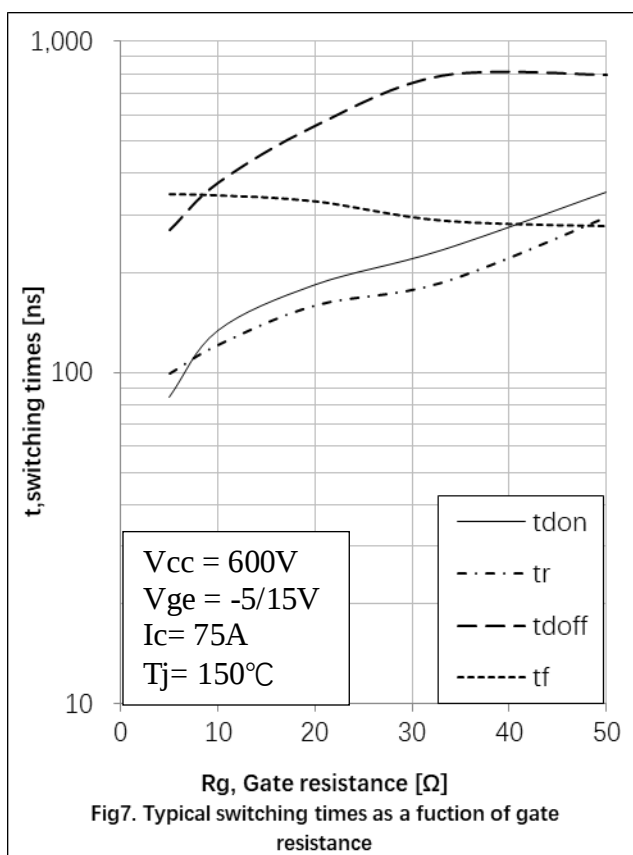
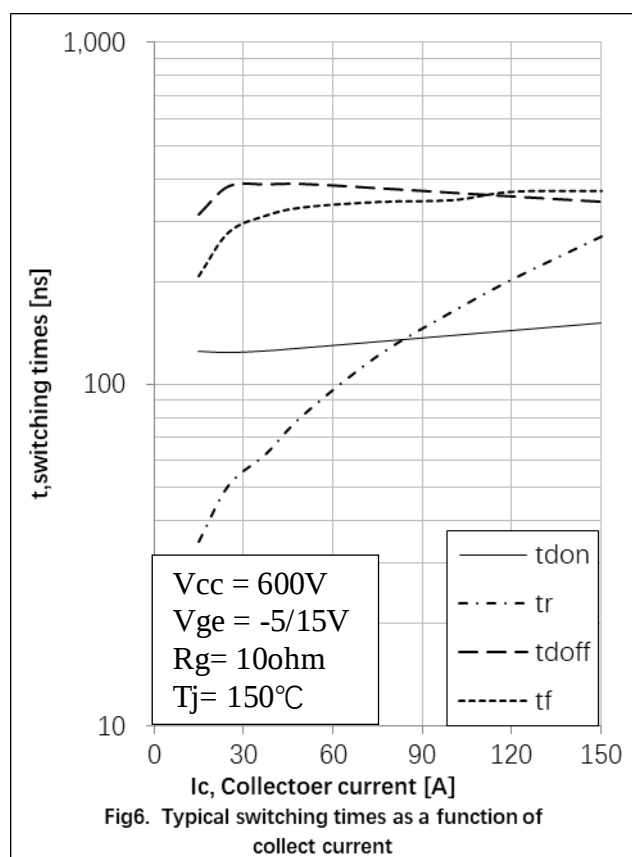
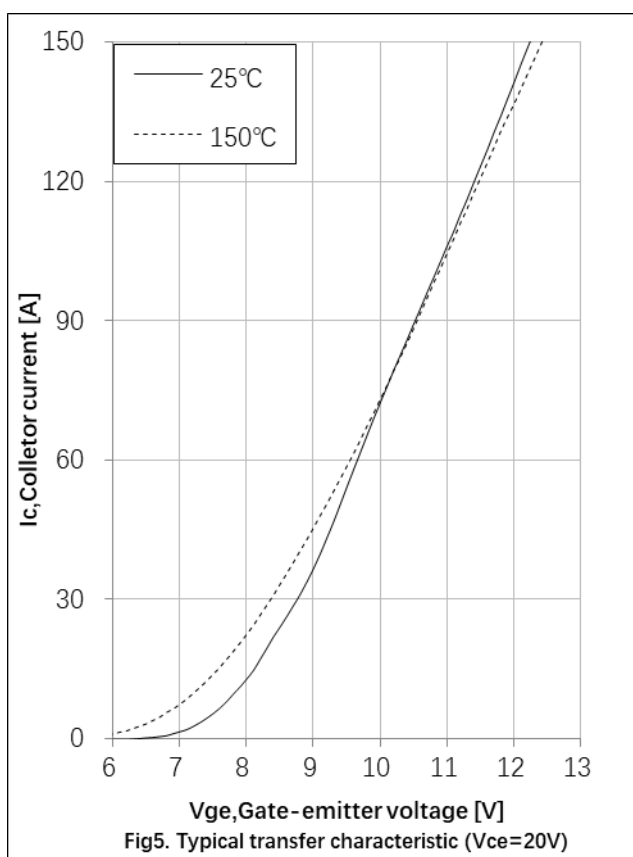
Thermal characteristics

Parameter	Symbol	Min	Typ	Max	Units
Operating Junction Temperature Range	T_J	-40		175	$^{\circ}C$
Storage Temperature Range	T_{stg}	-55		150	$^{\circ}C$
Thermal Resistance from Junction to Case (IGBT)	$R_{th_{J-C}}$		0.23		$^{\circ}C/W$
Thermal Resistance from Junction to Case (Diode)	$R_{th_{J-C}}$		0.35		$^{\circ}C/W$
Thermal Resistance from Junction to Ambient	$R_{th_{J-A}}$			40	$^{\circ}C/W$

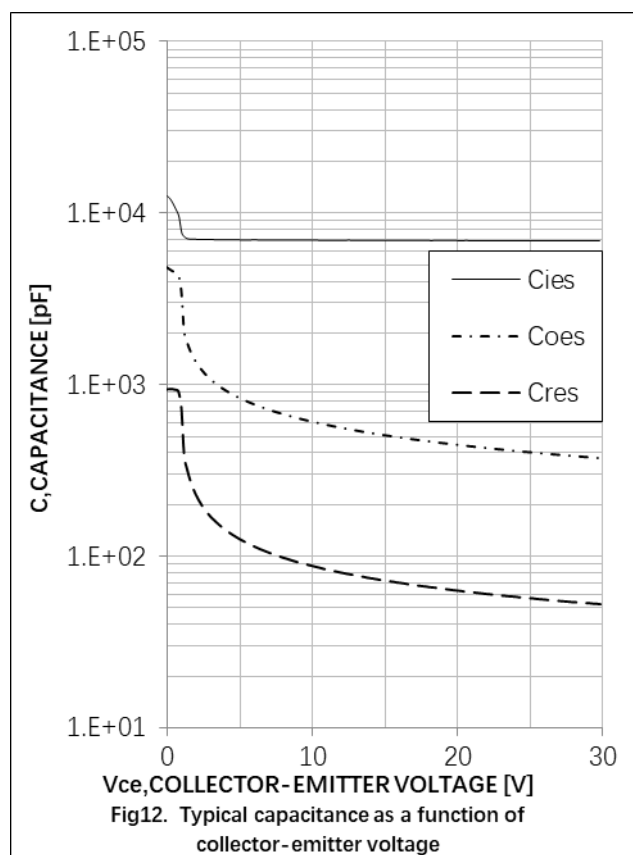
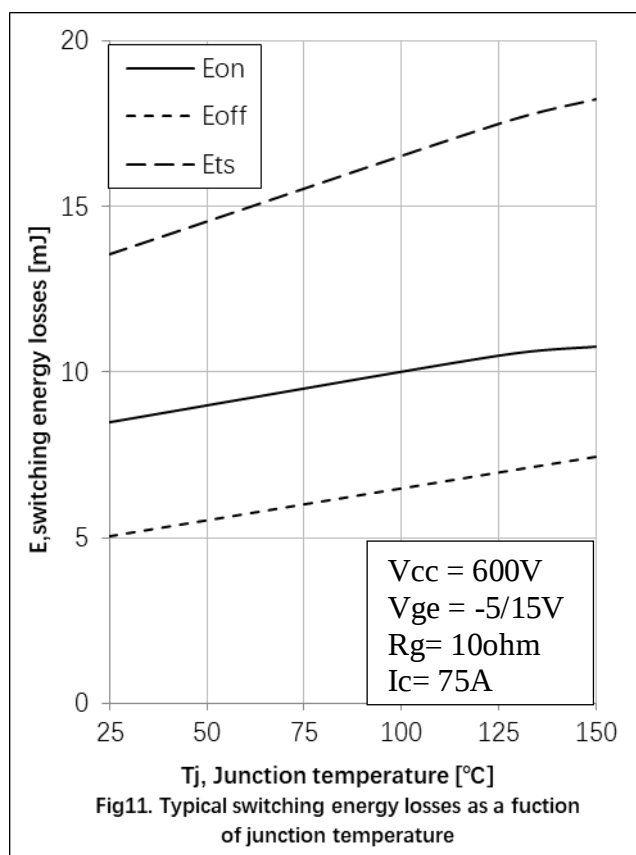
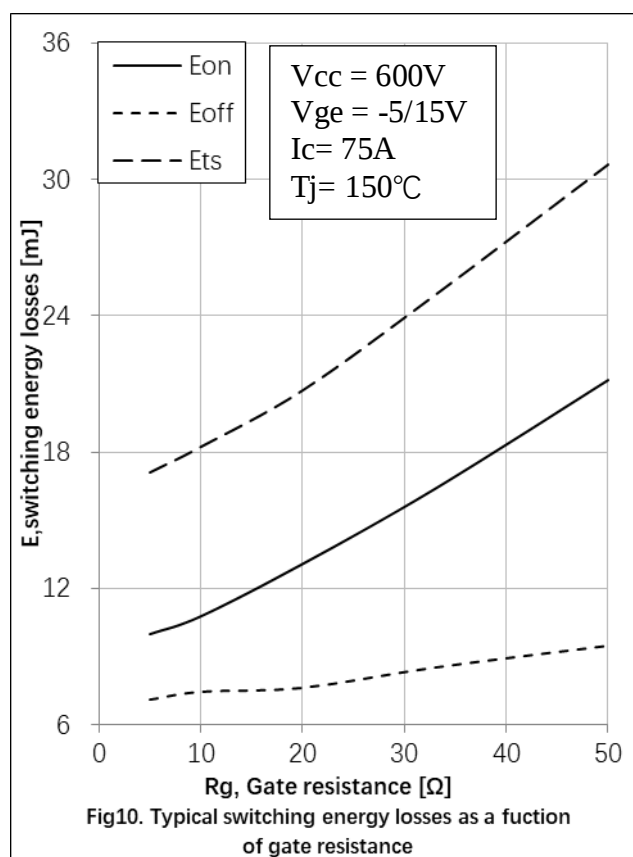
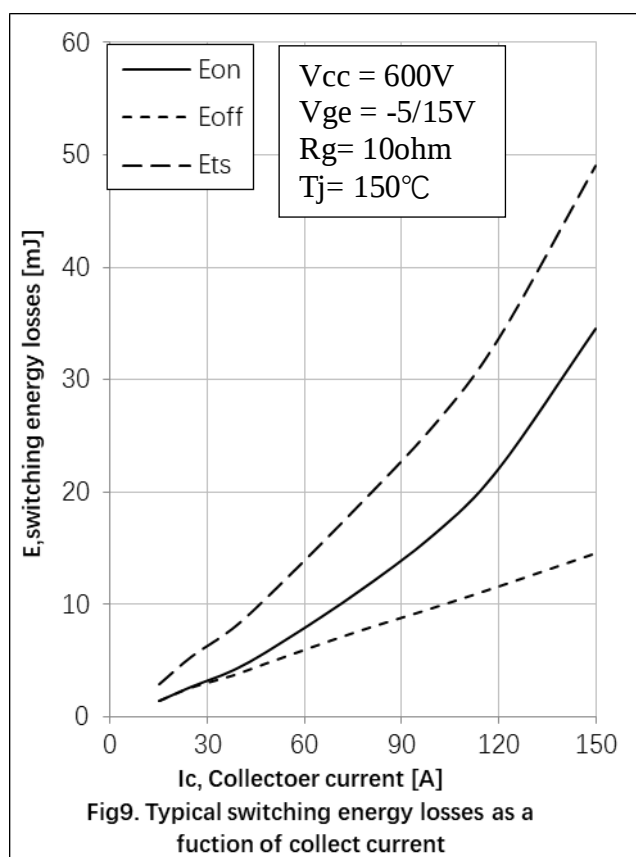
Curve Characteristics



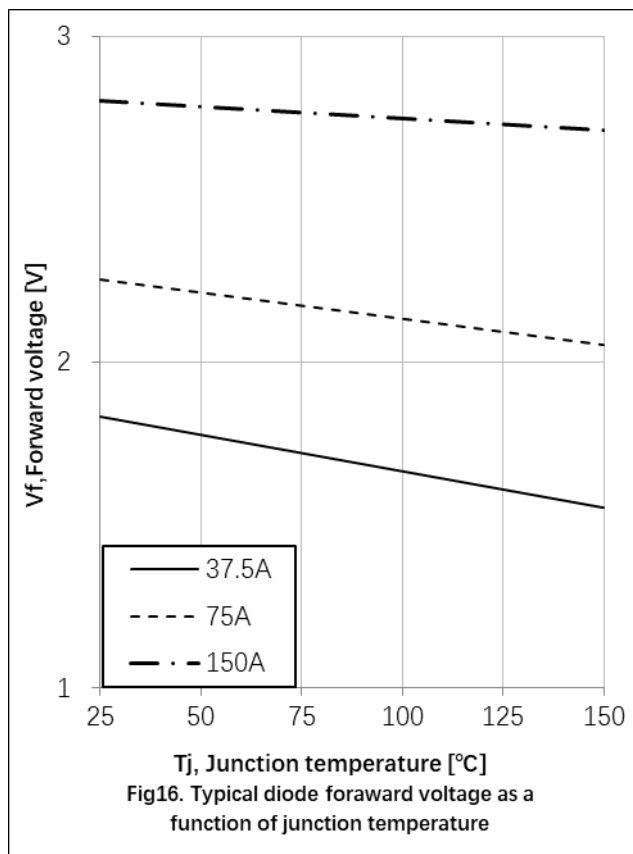
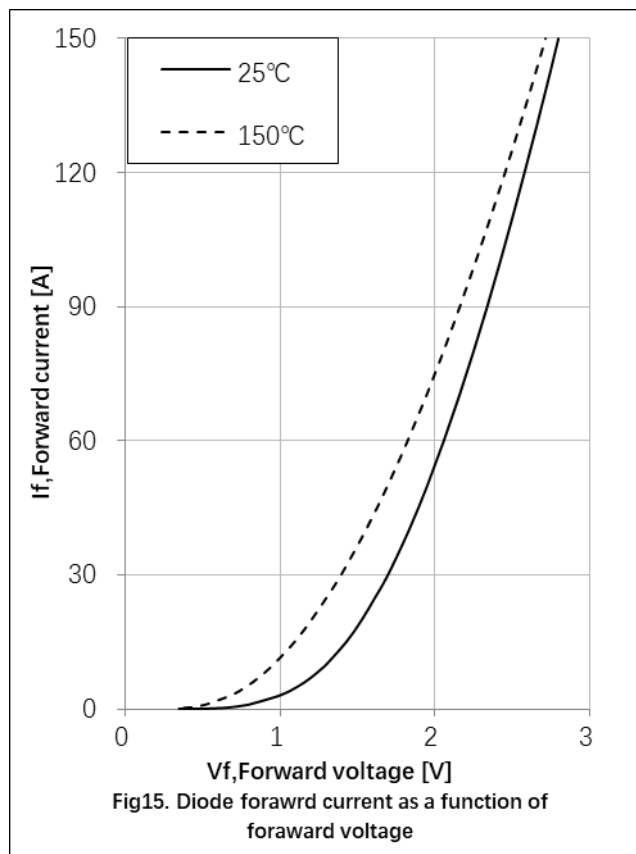
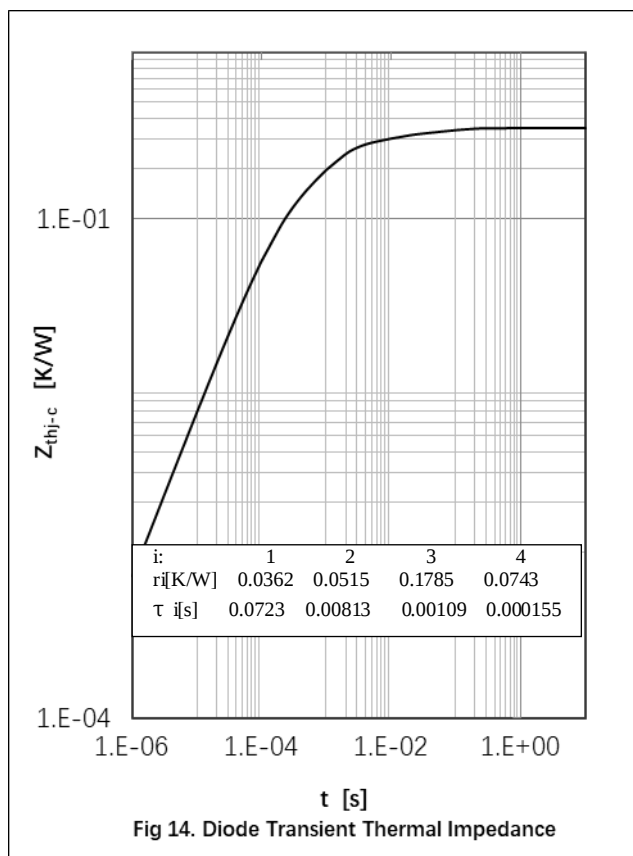
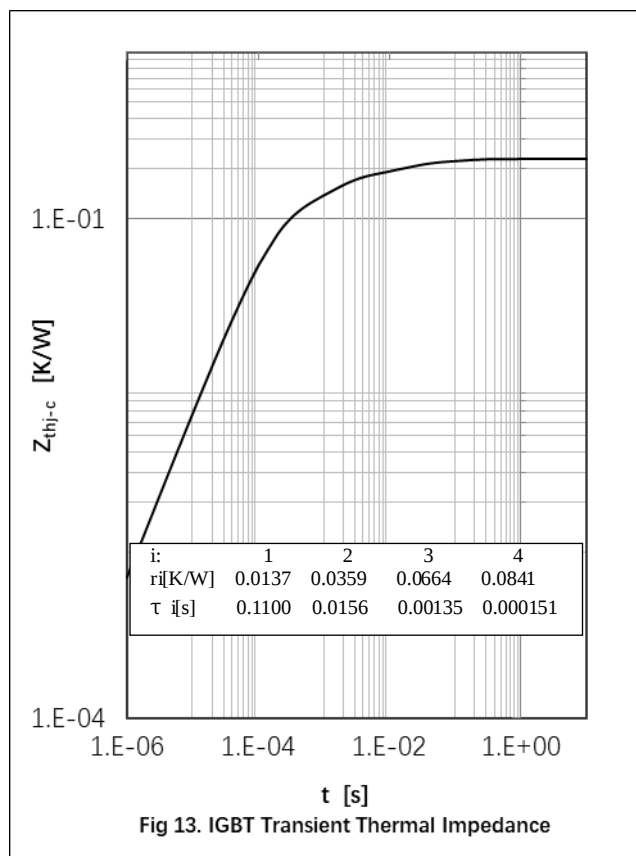
Curve Characteristics



Curve Characteristics



Curve Characteristics



Ordering Information

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

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