Features

- Low switching losses
- Maximum junction temperature 175°C
- Positive temperature coefficient
- High ruggedness, temperature stable
- High short circuit capability(5μs)
- Halogen Free. “Green” Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Applications

- High frequency switching application
- Medical applications
- Uninterruptible power supply
- Motion/servo control

Maximum Ratings

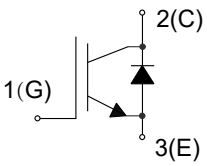
- Operating Junction Temperature Range : -40°C to +175°C
- Storage Temperature Range: -55°C to +150°C
- IGBT Thermal Resistance: 0.42°C/W Junction to Case
- Diode Thermal Resistance: 1.05°C/W Junction to Case
- Thermal Resistance: 40°C/W Junction to Ambient

Parameter		Symbol	Rating	Unit
Collector-Emitter Voltage		V_{CE}	650	V
DC Collector Current (2)	T_C=25°C	I_C	100	A
	T_C=100°C		50	
Pulsed Collector Current (3) V_{GE}=15V		I_{CM}	200	A
Diode Forward Current (2)	T_C=25°C	I_F	60	A
	T_C=100°C		30	
Diode Pulsed Current (3)		$I_{F,puls}$	120	A
Gate-Emitter Voltage		V_{GE}	±20	V
Transient Gate-Emitter Voltage			±30	
Short Circuit Withstand Time V_{GE}=15V, V_{CC}=400V, V_{CEM}≤650V		t_{SC}	5	μs
Power Dissipation	T_j=25°C	P_D	357	W

Note:

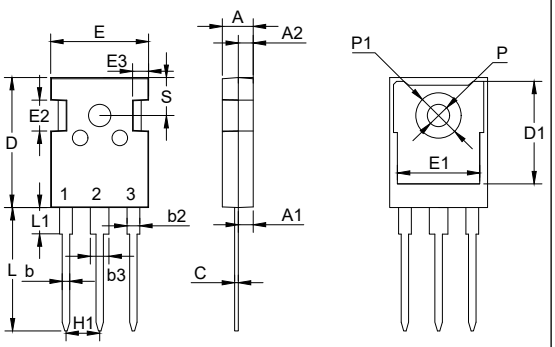
1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. Limited by T_{Jmax}.
3. T_p limited by T_{Jmax}.

Internal Structure



Trench and Field Stop IGBT 650V 50A

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	

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
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℃		1.95	2.40	V
		V_{GE}=15V, I_C=50A, T_J=125℃		2.30		
		V_{GE}=15V, I_C=50A, T_J=150℃		2.40		
G-E Threshold Voltage	$V_{GE(th)}$	I_C=800μA, V_{GE}=V_{CE}	4.5	5.0	5.5	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℃			4.00	
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		2.07		nF
Reverse Transfer Capacitance	C_{res}			0.83		
Gate Charge	Q_g	V_{CC}=300V,I_C=50A,V_{GE}=15V		0.21		μC
Short Circuit Collector Current	Isc	V_{GE}=15V, tsc≤5μs, V_{cc}=400V,T_J≤150°C		250		A
IGBT Switching Characteristics						
Turn-On Delay Time	$td_{(on)}$	V_{CC}=300V, I_C=50A, V_{GE}=-15~15V, R_G=20Ω, Ls=60nH		28		ns
Rise Time	t_r			50		
Turn-Off Delay Time	$td_{(off)}$			129		
Fall Time	t_f			51		
Turn-On Energy	E_{on}			1.49		mJ
Turn-Off Energy	E_{off}			0.67		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=300V, I_C=50A, V_{GE}=-15~15V, R_G=20Ω, Ls=60nH T_J=125°C		35		ns
Rise Time	t_r			60		
Turn-Off Delay Time	$td_{(off)}$			220		
Fall Time	t_f			60		
Turn-On Energy	E_{on}			2.21		mJ
Turn-Off Energy	E_{off}			1.02		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=300V, I_C=50A, V_{GE}=-15~15V, R_G=20Ω, Ls=60nH T_J=150°C		38		ns
Rise Time	t_r			64		
Turn-Off Delay Time	$td_{(off)}$			230		
Fall Time	t_f			63		
Turn-On Energy	E_{on}			2.54		mJ
Turn-Off Energy	E_{off}			1.15		

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Static Characteristics						
Diode Forward Voltage	V_F	I_F=30A, T_J=25℃		2.00	2.50	V
		I_F=30A, T_J=125℃		1.95		
		I_F=30A, T_J=150℃		1.95		
Diode Dynamic Characteristics						
Reverse Recovery Current	I_{rr}	V_R=300V, I_F=50A, di/dt=-437A/μs, T_J=25℃		5		A
Reverse Recovery Charge	Q_{rr}			0.09		μC
Diode Reverse Recovery Time	t_{rr}			35		ns
Reverse Recovery Energy	E_{rec}			0.03		mJ
Reverse Recovery Current	I_{rr}	V_R=300V, I_F=50A, di/dt=-437A/μs, T_J=125℃		7.2		A
Reverse Recovery Charge	Q_{rr}			0.18		μC
Diode Reverse Recovery Time	t_{rr}			70		ns
Reverse Recovery Energy	E_{rec}			0.06		mJ
Reverse Recovery Current	I_{rr}	V_R=300V, I_F=50A, di/dt=-437A/μs, T_J=150℃		8.4		A
Reverse Recovery Charge	Q_{rr}			0.20		μC
Diode Reverse Recovery Time	t_{rr}			78		ns
Reverse Recovery Energy	E_{rec}			0.07		mJ

Curve Characteristics

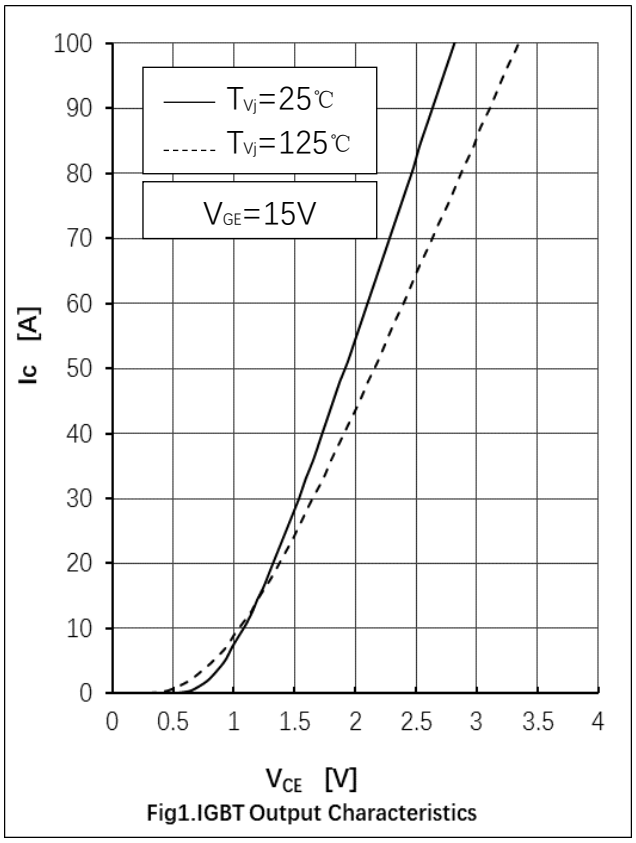


Fig1.IGBT Output Characteristics

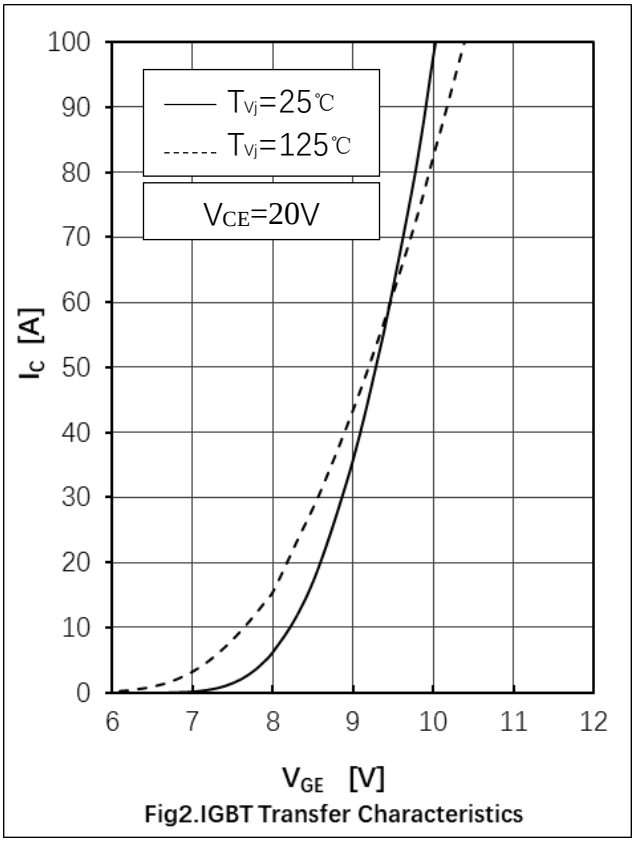


Fig2.IGBT Transfer Characteristics

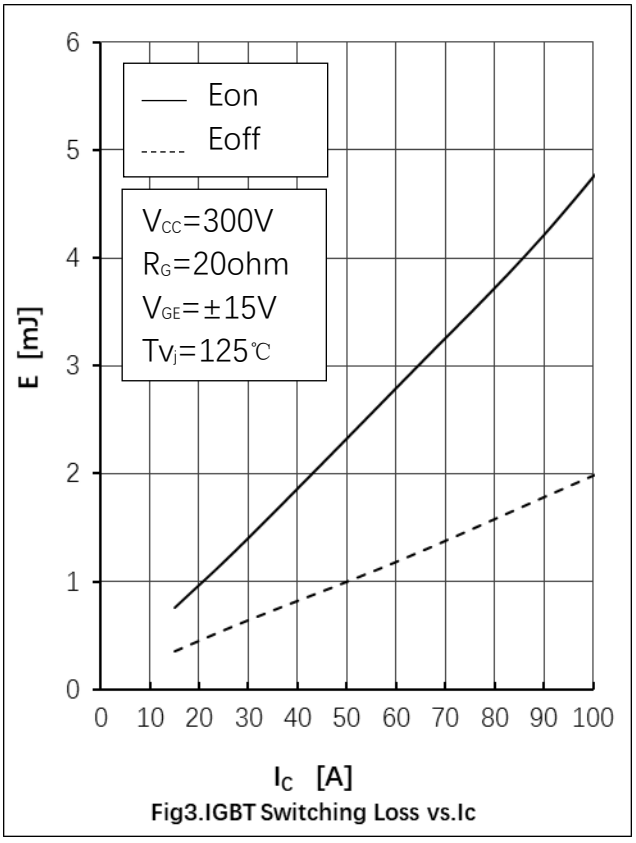


Fig3.IGBT Switching Loss vs.Ic

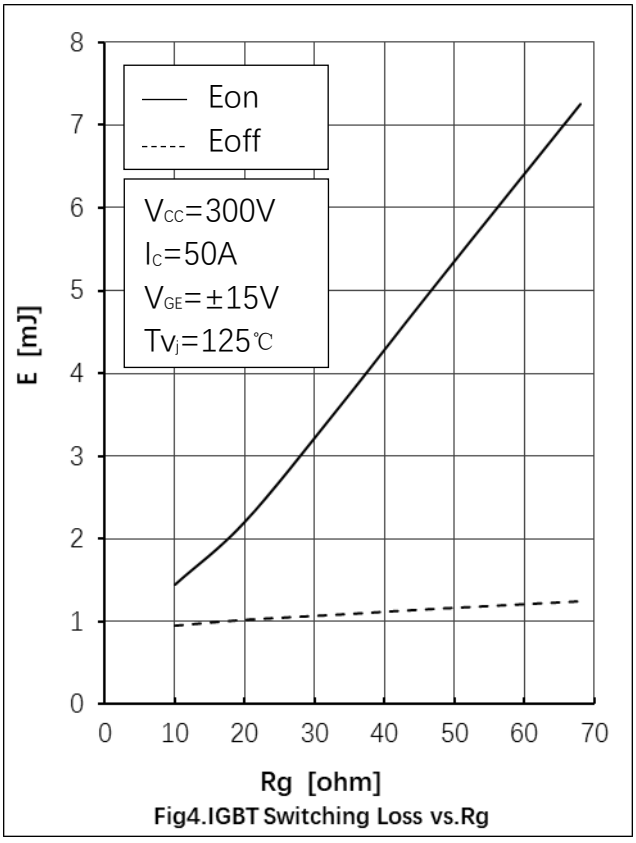


Fig4.IGBT Switching Loss vs.Rg

Curve Characteristics

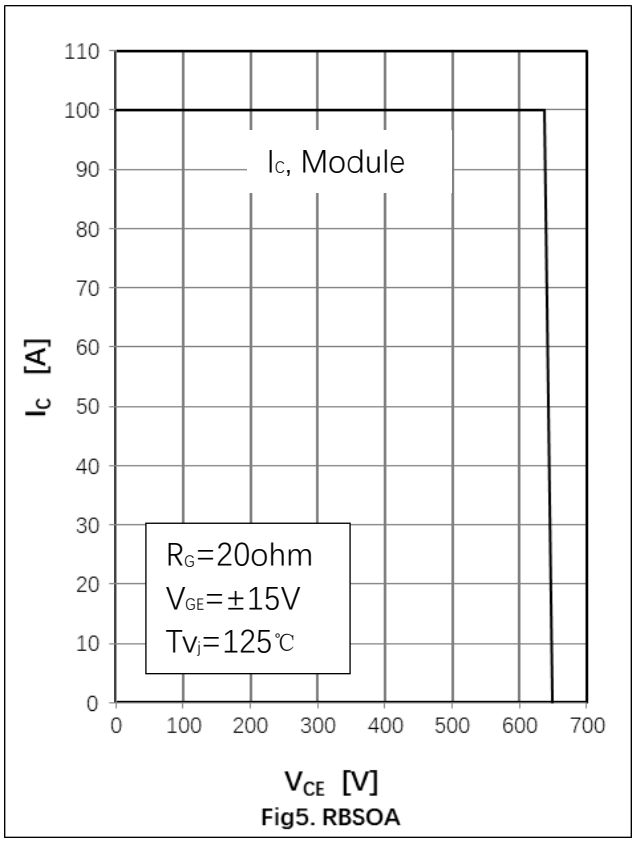


Fig5. RBSOA

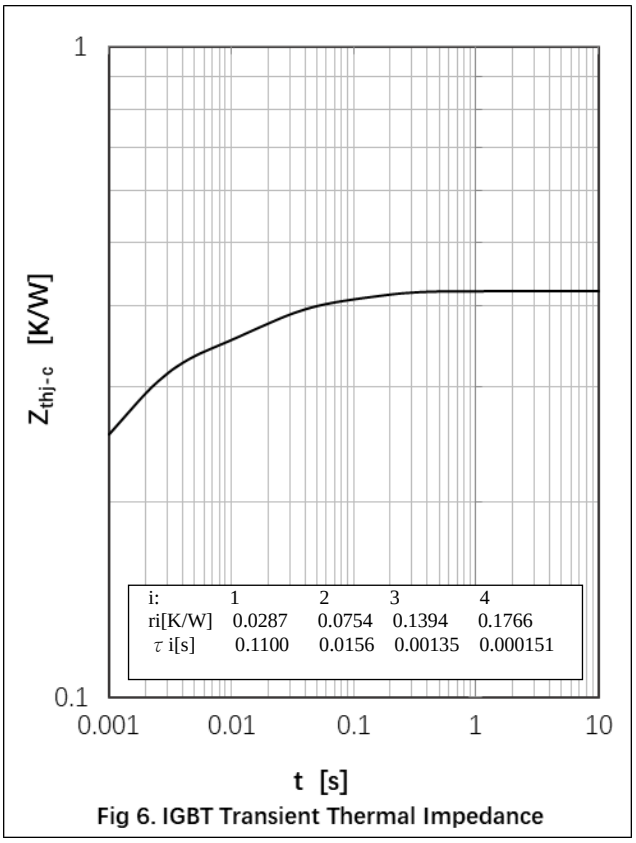


Fig 6. IGBT Transient Thermal Impedance

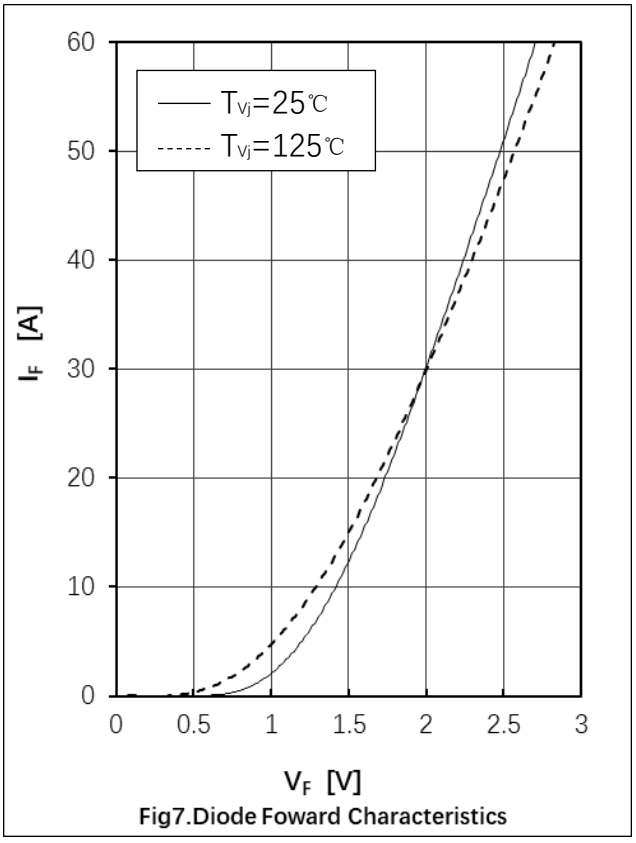


Fig7.Diode Foward Characteristics

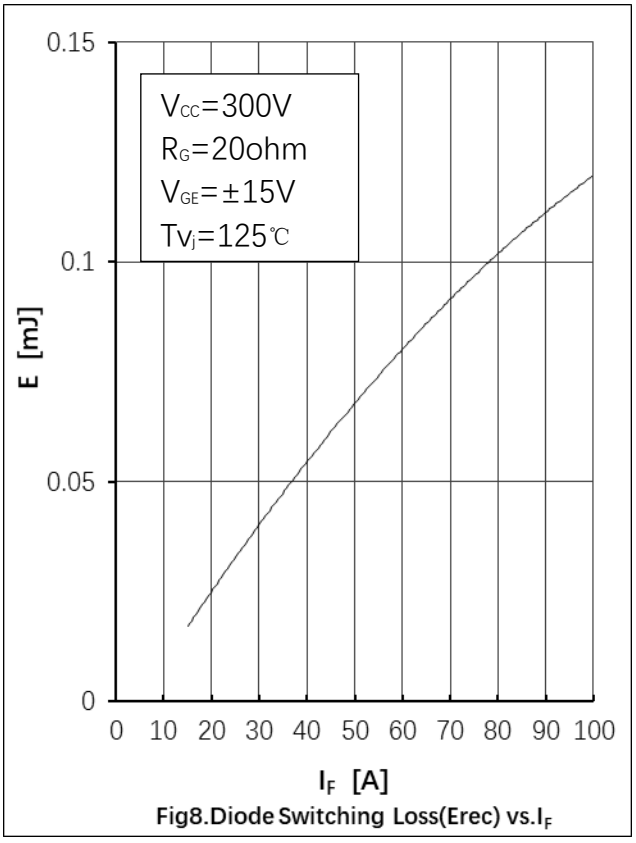


Fig8.Diode Switching Loss(Erec) vs.I_F

Curve Characteristics

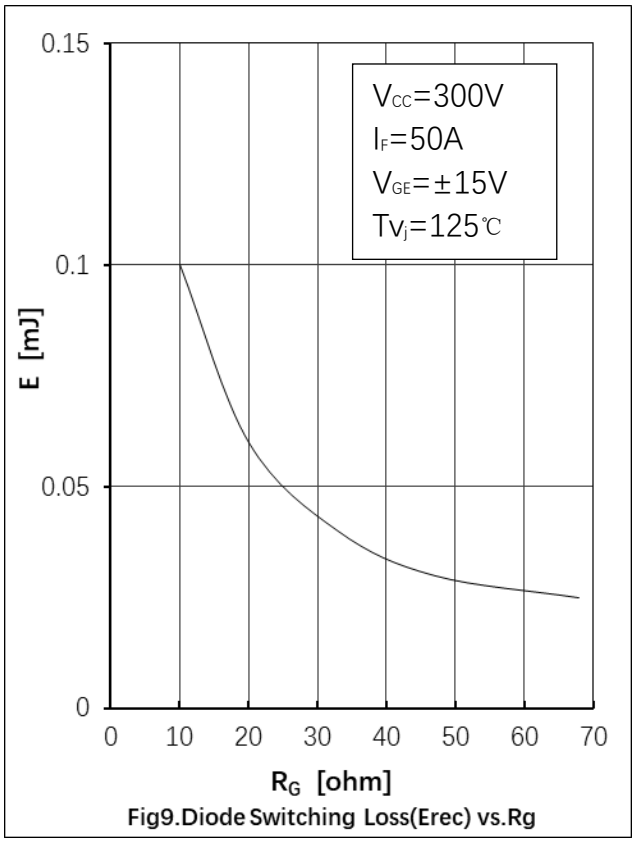


Fig9.Diode Switching Loss(Erec) vs.Rg

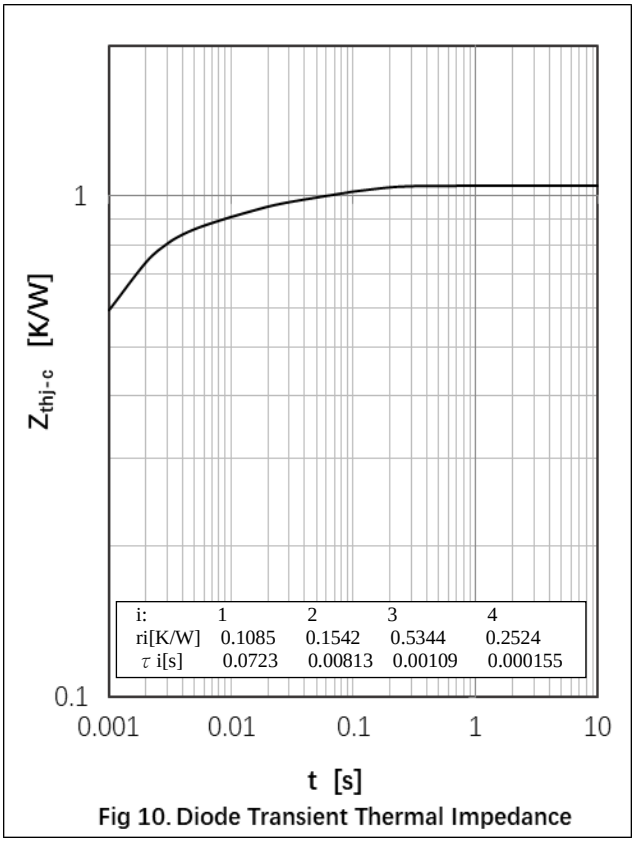


Fig 10. Diode Transient Thermal Impedance

Ordering Information

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