



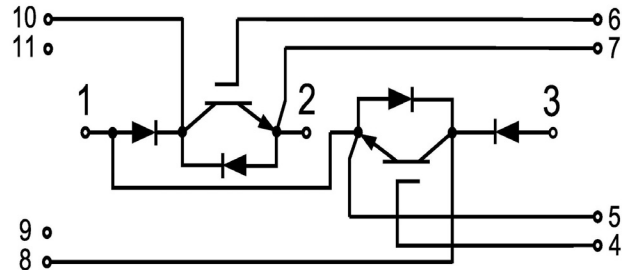
GT300TD120T2VH

IGBT Module

Preliminary Data

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated $>10\mu\text{s}$
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested ($2 \times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- Welding
- HEV Inverter
- Industrial Motor Drives
- UPS

IGBT, Inverter

Maximum Rated Values ($T_C=25^\circ\text{C}$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_C=100^\circ\text{C}$	300	A
		$T_C=25^\circ\text{C}$	580	A
I_{CM}	Repetitive Peak Collector Current	$T_J=175^\circ\text{C}$	600	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	$T_C=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	1975	W



Electrical Characteristics of IGBT ($T_C=25^\circ\text{C}$ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 4\text{mA}, V_{CE} = V_{GE}$	5.0	5.6	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 300\text{A}, V_{GE} = 15\text{V}$	$T_J=25^\circ\text{C}$	1.70	1.90	V
			$T_J=125^\circ\text{C}$	1.90		V
			$T_J=150^\circ\text{C}$	2.00		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}, T_J = 25^\circ\text{C}$			400	nA
C_{ies}	Input Capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		25.2		nF
C_{res}	Reverse Transfer Capacitance			0.86		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C = 300\text{A}, R_{Gon} = 2\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	0.39		μs	
			$T_J=125^\circ\text{C}$	0.40			
			$T_J=150^\circ\text{C}$	0.40			
t_r	Rise Time		$T_J=25^\circ\text{C}$	0.13		μs	
			$T_J=125^\circ\text{C}$	0.13			
			$T_J=150^\circ\text{C}$	0.13			
$t_{d(off)}$	Turn-off Delay Time		$V_{CC} = 600\text{V}, I_C = 300\text{A}, R_{Goff} = 2\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	0.39		μs
				$T_J=125^\circ\text{C}$	0.42		
				$T_J=150^\circ\text{C}$	0.42		
t_f	Fall Time	$T_J=25^\circ\text{C}$		0.13		μs	
		$T_J=125^\circ\text{C}$		0.19			
		$T_J=150^\circ\text{C}$		0.21			
E_{on}	Turn-on Switching Loss	$V_{CC} = 600\text{V}, I_C = 300\text{A}, R_{Gon} = 2\Omega, V_{GE} = \pm 15\text{V},$ $di/dt=1880\text{A}/\mu\text{s} (T_J=150^\circ\text{C})$ Inductive Load		$T_J=25^\circ\text{C}$	20.6		mJ
				$T_J=125^\circ\text{C}$	27.3		
				$T_J=150^\circ\text{C}$	29.7		



E _{off}	Turn-off Switching Loss	V _{CC} = 600V, I _C = 300A, R _{Goff} = 2Ω, V _{GE} = ±15V, du/dt=3300V/μs (T _J =150°C) Inductive Load	T _J =25°C	26.7	mJ
			T _J =125°C	35.6	
			T _J =150°C	38.3	
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C	1.56	μC
R _{g internal}	Internal Gate Resistance		T _J =25°C	2.5	Ω
RBSOA	I _C =600A, V _{CC} =1050V, V _p =1200V, R _{Goff} = 2Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid	
I _{SC}	SC Data	V _{CC} =600V, V _{GE} =±15V, R _{Gon} =2ohm, R _{Goff} =2ohm, tp=10us, T _J =125°C, Inductive Load		1594	A
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case(per leg)				0.076 °C/W

Diode Inverter Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	200	A
I _{FM}	Diode Maximum Forward Current	400	A

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F =200A	T _J =25°C	1.60		V
			T _J =125°C	1.70		
			T _J =150°C	1.70		
t _{rr}	Reverse Recovery Time		T _J =25°C	0.32		μs
			T _J =125°C	0.53		
			T _J =150°C	0.56		
I _{rr}	Peak Reverse Recovery Current	I _F =200A, -di _F /dt =1855A/μs(T _J =150°C), V _R = 600V, V _{GE} = -15V	T _J =25°C	128		A
			T _J =125°C	144		
			T _J =150°C	150		
Q _{rr}	Reverse Recovery Charge		T _J =25°C	20.7		μC
			T _J =125°C	34.5		
			T _J =150°C	38.8		



E _{rec}	Reverse Recovery Energy	I _F =200A, -diF/dt = 1855A/μs(T _J =150°C), V _R = 600V, V _{GE} = -15V	T _J =25°C	8.5	mJ
			T _J =125°C	14.1	
			T _J =150°C	16.5	
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per leg)			0.166	°C/W

Diode, Clamp

Maximum Rated Values of Diode (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	300	A
I _{FM}	Diode Maximum Forward Current	600	A

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

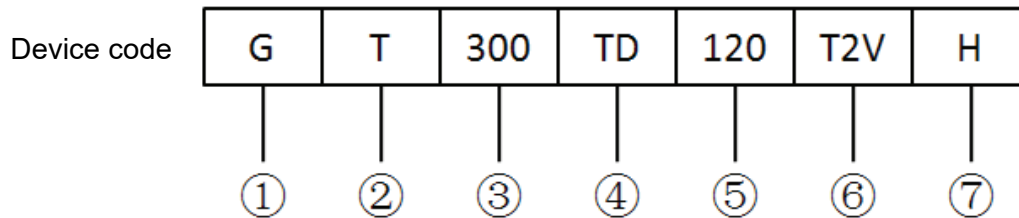
Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F = 300A	T _J =25°C	1.80		V
			T _J =125°C	1.80		
			T _J =150°C	1.80		
t _{rr}	Reverse Recovery Time	I _F = 300A, -diF/dt = 2010A/μs(T _J =150°C), V _R = 600V, V _{GE} = -15V	T _J =25°C	0.41		μs
			T _J =125°C	0.60		
			T _J =150°C	0.64		
I _{rr}	Peak Reverse Recovery Current	I _F = 300A, -diF/dt = 2010A/μs(T _J =150°C), V _R = 600V, V _{GE} = -15V	T _J =25°C	150		A
			T _J =125°C	181		
			T _J =150°C	191		
Q _{rr}	Reverse Recovery Charge	I _F = 300A, -diF/dt = 2010A/μs(T _J =150°C), V _R = 600V, V _{GE} = -15V	T _J =25°C	29.7		μC
			T _J =125°C	50.7		
			T _J =150°C	57.8		
E _{rec}	Reverse Recovery Energy	I _F = 300A, -diF/dt = 2010A/μs(T _J =150°C), V _R = 600V, V _{GE} = -15V	T _J =25°C	12.9		mJ
			T _J =125°C	22.0		
			T _J =150°C	25.4		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per leg)				0.134	°C/W



Module

Symbol	Description	Min	Typ	Max	Unit
V _{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500		V
T _J	Maximum Junction Temperature			175	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		+150	°C
T _{stg}	Storage Temperature	-40		+125	°C
CTI	Comparative Tracking Index	200			
R _{θCS}	Case-To-Sink Thermally (Conductive Grease Applied)			0.03	°C/W
T	Power Terminals Screw:M6	3.0		5.0	N·m
T	Mounting Screw:M6	4.0		6.0	N·m
G	Weight		300		g

Ordering Information Table



- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (300=300A)
- ④ - Circuit Configuration (Half Bridge、Clamp Diode on Collector)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

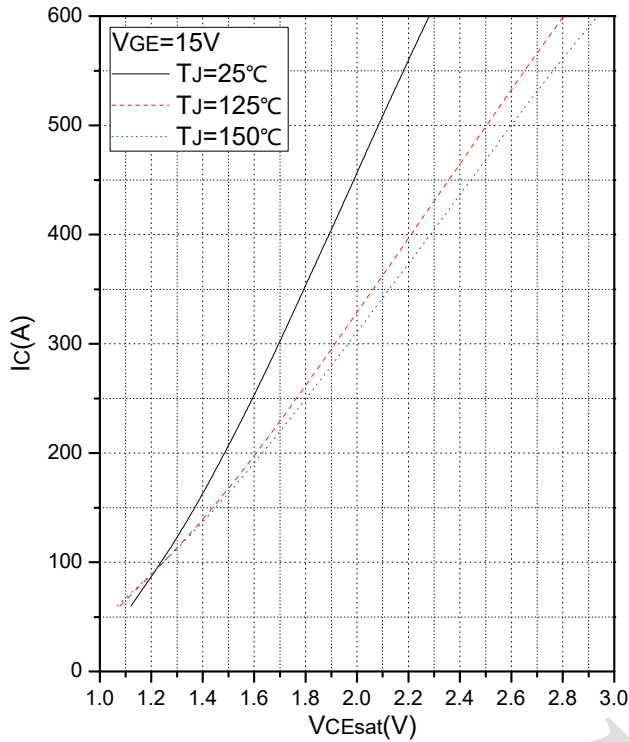


Fig.1 Typical Saturation Voltage Characteristics

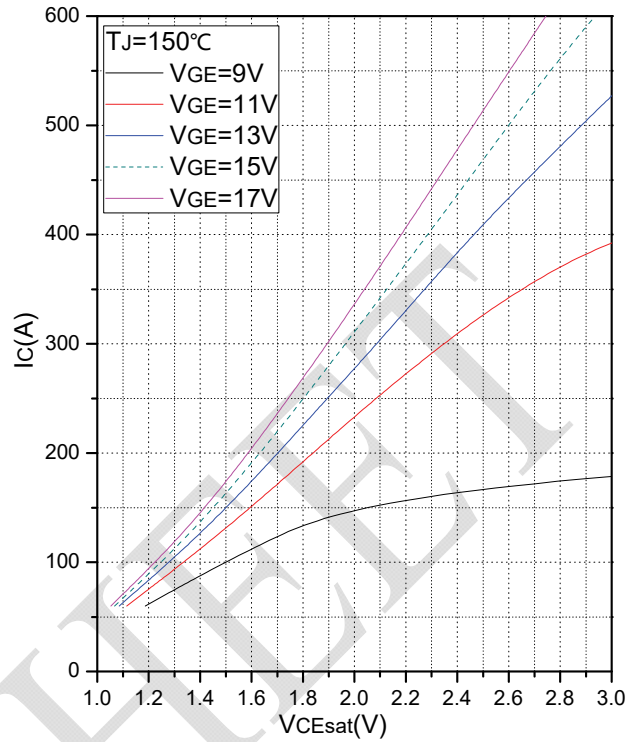


Fig.2 Typical Output Characteristics

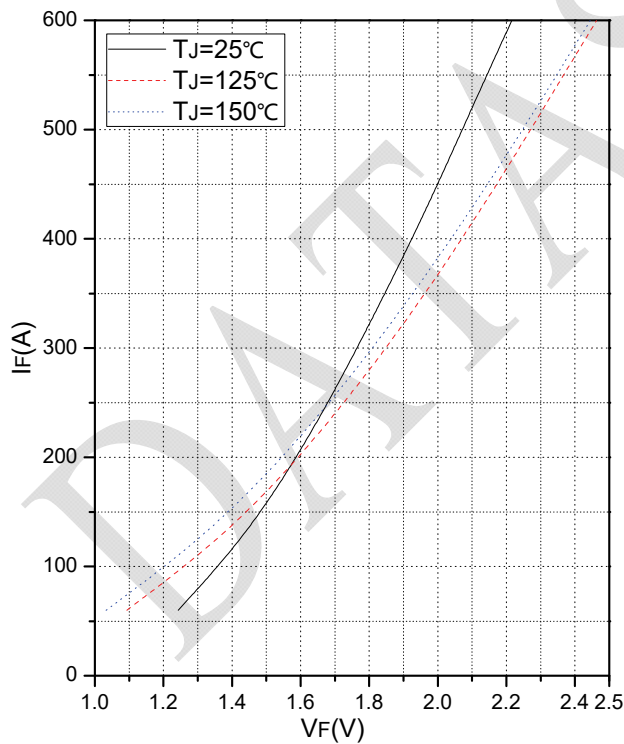


Fig.3 Forward Characteristics of Diode-Inverter

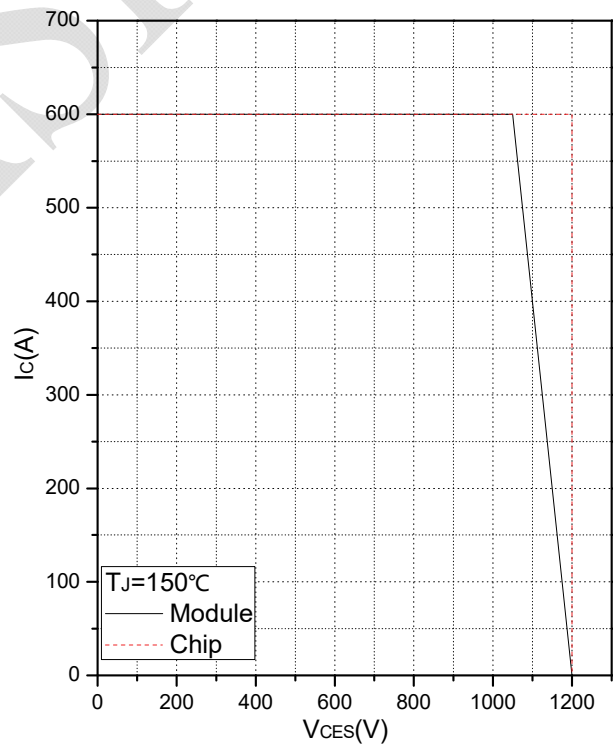


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

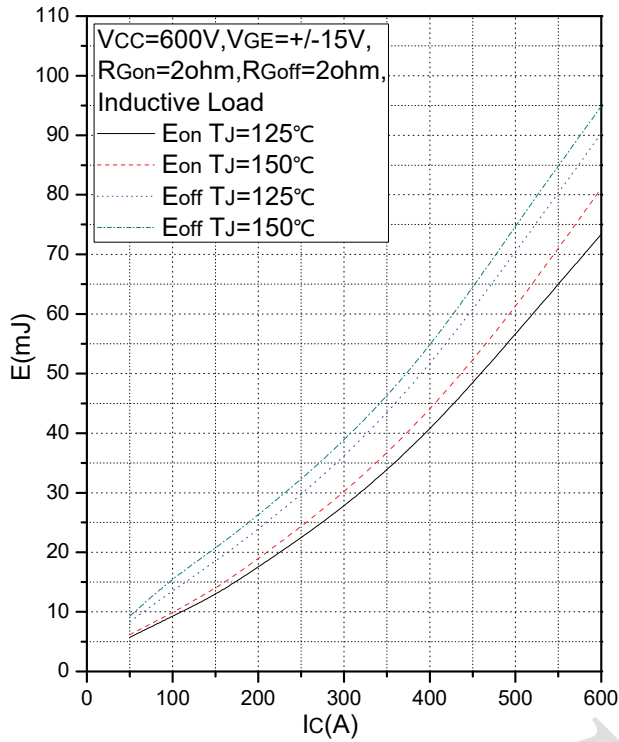


Fig.5 Typical Switching Loss vs. Collector Current

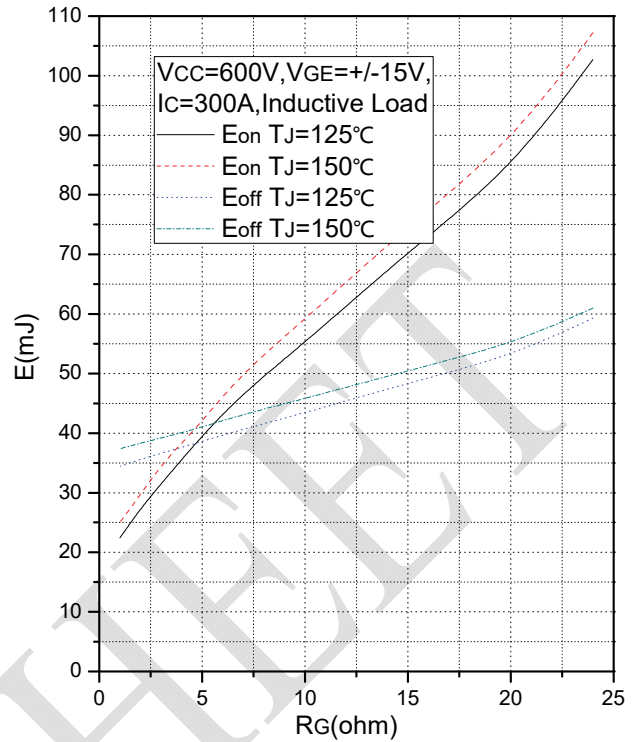


Fig.6 Typical Switching Loss vs. Gate Resistance

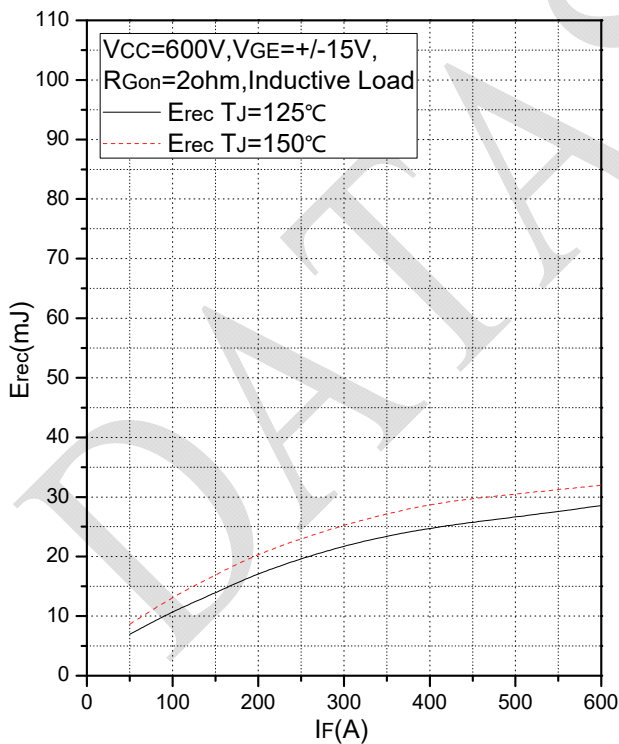


Fig.7 Typical Switching Loss vs. Forward Current

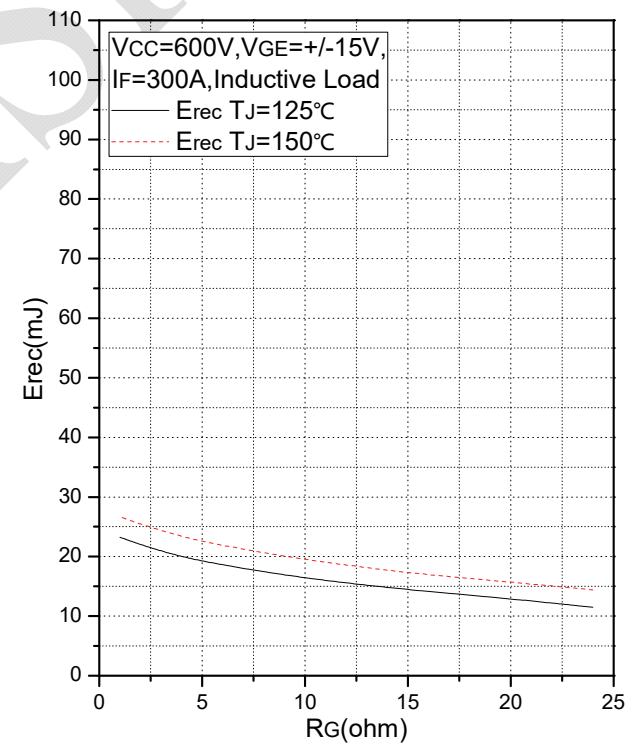


Fig.8 Typical Switching Loss vs. Gate Resistance

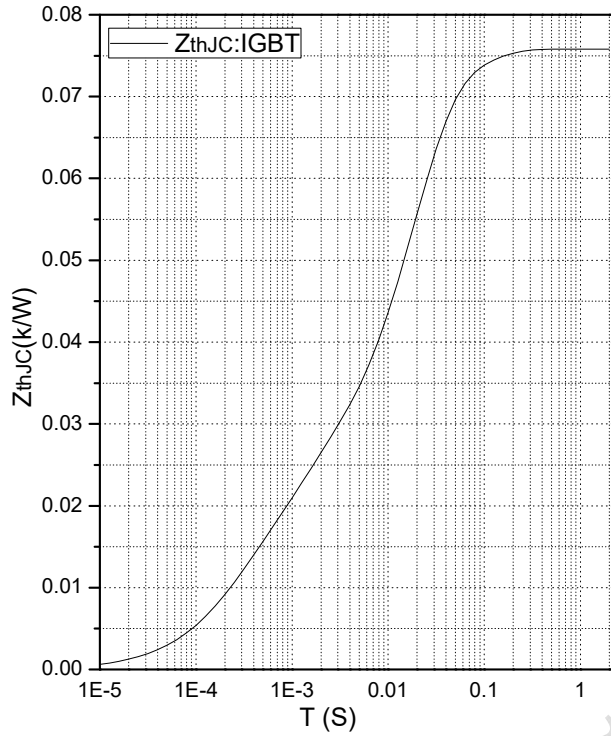


Fig.9 Transient Thermal Impedance (IGBT)

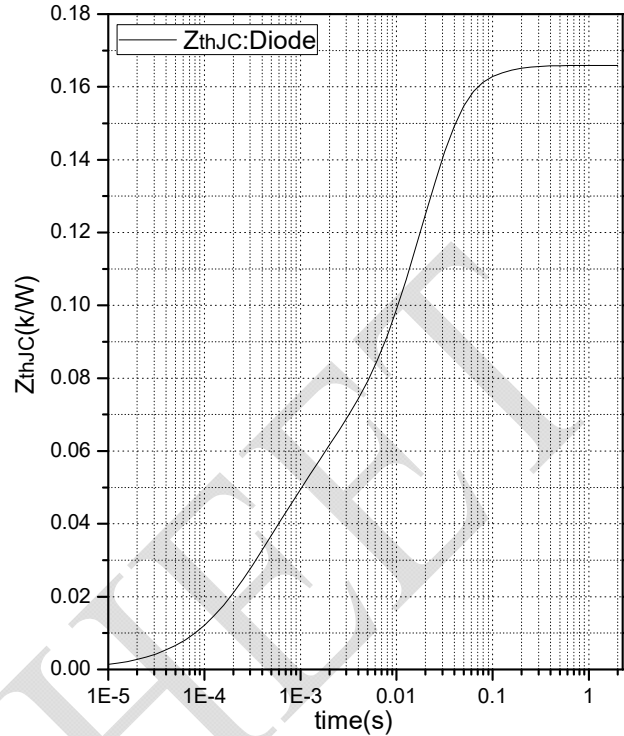


Fig.10 Transient Thermal Impedance (Inverter-Diode)

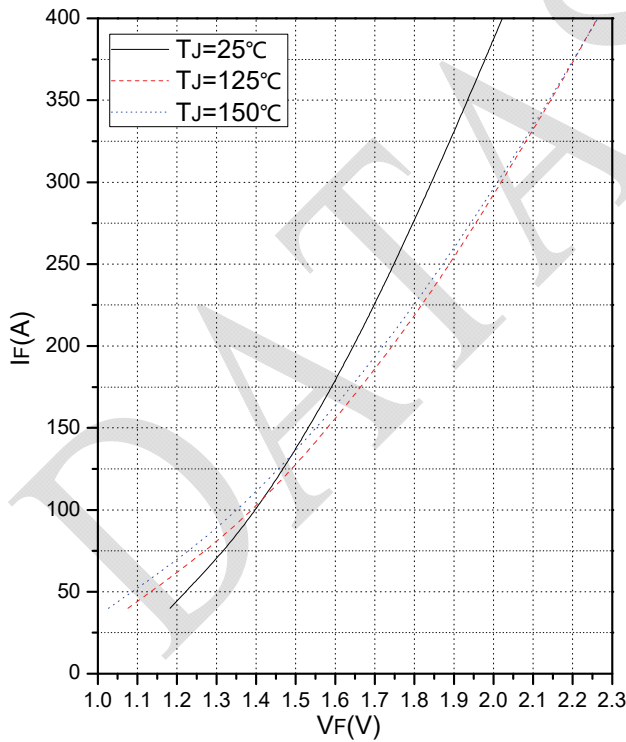


Fig.11 Forward Characteristics of Diode-Clamp

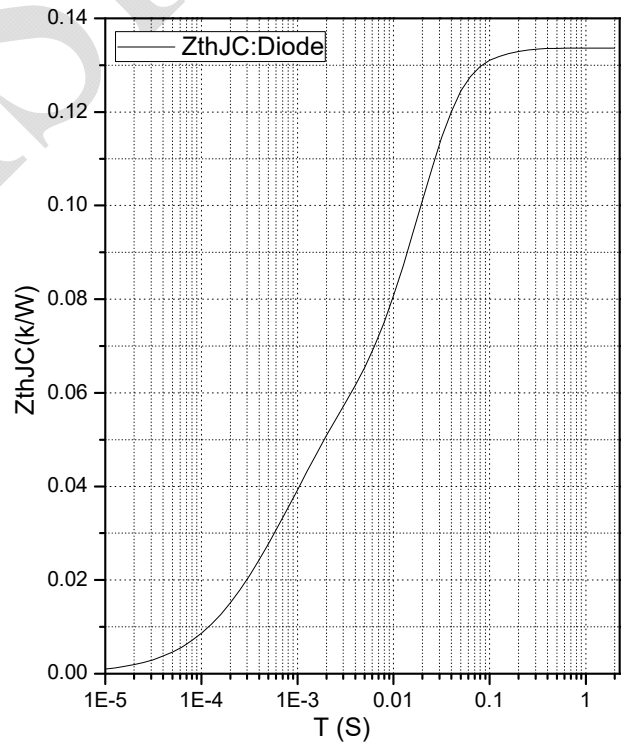


Fig.12 Transient Thermal Impedance (Clamp-Diode)



Date	Revision	Notes
12/23/2021	01	Initial release

Announcement

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The released datasheet would be issued with "REV." + "alphabet characters".

DATA SHEET