

HALF BRIDGE IGBT Module

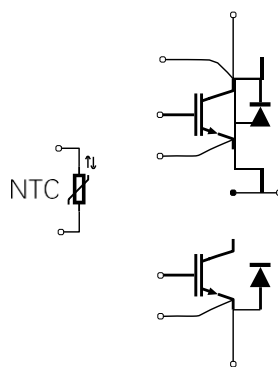
Features

- Trench+ Field Stop Technology
- V_{CESat} with positive Temperature Coefficient
- Low V_{CESat}

Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Block Diagram



Product Summary		
$V_{CES}(V)$	$V_{CESAT}(V)_{Typ}$	$I_c(A)$
1700	1.71 @ 15V,300A	300

IGBT, Inverter

Table1 Absolute Maximum Ratings ($T_c=25^\circ C$, unless otherwise specified)

Parameters	Symbol	Value	Unit
Collector-Emmitter Voltage	V_{CES}	1700	V
Gate-Emmitter Voltage	V_{GES}	± 20	V
Collector DC Current-continuous $T_c=90^\circ C$, $T_j \text{ max}=150^\circ C$	I_c	300	A
Repetitive peak collector current $t_p=1ms$	I_{CRM}	600	A
Total power dissipation	P_D	910	W

Table 2. Electrical Characteristics ($T_j=25^\circ C$, unless otherwise specified)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_c=300A, T_j=25^\circ C$		1.71		V
		$V_{GE}=15V, I_c=300A, T_j=125^\circ C$		2.08		
		$V_{GE}=15V, I_c=300A, T_j=150^\circ C$		2.14		
Gate Threshold Voltage	$V_{GE(TH)}$	$V_{CE}=V_{GE}, I_c=12mA$		5.69		V
Internal gate resistor	R_{gint}	$T_j=25^\circ C$		3.8		Ω
Gate charge	Q_G	$V_{GE}=-8V \sim +15V, V_{CE}=900V$		1.84		μC
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=1700V, V_{GE}=0V$			4	mA
Gate-body Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$			450	nA

Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		33.01		nF
Reverse Transfer Capacitance	C_{res}			0.09		nF
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=900V, I_C=300A,$ $V_{GE}=-8V/+15V, R_G=3.3\Omega,$ $di/dt_{on}=2700A/\mu s,$ $dv/dt_{off}=4700V/\mu s$ $T_J=25^\circ C$		271.6		ns
Turn-On Rise Time	t_r			89.6		ns
Turn-Off Delay Time	$t_{d(off)}$			604		ns
Turn-Off Fall Time	t_f			488		ns
Turn-On energy	E_{on}			87		mJ
Turn-Off energy	E_{off}			70		mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=900V, I_C=300A,$ $V_{GE}=-8V/+15V, R_G=3.3\Omega,$ $di/dt_{on}=2100A/\mu s,$ $dv/dt_{off}=3600V/\mu s$ $T_J=125^\circ C$		252		ns
Turn-On Rise Time	t_r			116		ns
Turn-Off Delay Time	$t_{d(off)}$			752		ns
Turn-Off Fall Time	t_f			738		ns
Turn-On energy	E_{on}			125		mJ
Turn-Off energy	E_{off}			99		mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=900V, I_C=300A,$ $V_{GE}=-8V/+15V, R_G=3.3\Omega,$ $di/dt_{on}=2000A/\mu s,$ $dv/dt_{off}=3400V/\mu s$ $T_J=150^\circ C$		274		ns
Turn-On Rise Time	t_r			116		ns
Turn-Off Delay Time	$t_{d(off)}$			782		ns
Turn-Off Fall Time	t_f			928		ns
Turn-On energy	E_{on}			145		mJ
Turn-Off energy	E_{off}			105		mJ
Temperature under switching conditions	T_{vjop}		-40		150	$^\circ C$
SC data	I_{sc}	$t_p \leq 8\mu s, V_{GE}=15V,$ $V_{CC}=1000V, V_{CEM} \leq 1700V,$ $T_J=25^\circ C$		1500		A
		$t_p \leq 6\mu s, V_{GE}=15V,$ $V_{CC}=1000V, V_{CEM} \leq 1700V,$ $T_J=150^\circ C$		1320		A

Diode, Inverter

Table1 Absolute Maximum Ratings ($T_c=25^\circ C$, unless otherwise specified)

Parameters	Symbol	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	1700	V
Continuous DC forward current	I_F	300	A
Repetitive peak forward current $t_p=1ms$	I_{FRM}	600	A
Implemented forward current	I_{FN}	300	A

Table 2. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V _F	I _F =300A, T _J =25°C		1.99		V
		I _F =300A, T _J =125°C		2.17		
		I _F =300A, T _J =150°C		2.09		
Diode Peak Reverse Recovery Current	I _{rrm}	I _F =300A V _R =900V		293		A
Reverse Recovery Charge	Q _{rr}	-diF/dt = 3400A/μs		54.54		μC
Reverse recovery energy	E _{rec}	T _J =25°C		22.52		mJ
Diode Peak Reverse Recovery Current	I _{rrm}	I _F =300A V _R =900V		294		A
Reverse Recovery Charge	Q _{rr}	-diF/dt = 2700A/μs		96.59		μC
Reverse recovery energy	E _{rec}	T _J =125°C		49.35		mJ
Diode Peak Reverse Recovery Current	I _{rrm}	I _F =300A V _R =900V		318		A
Reverse Recovery Charge	Q _{rr}	-diF/dt = 2600A/μs		128		μC
Reverse recovery energy	E _{rec}	T _J =150°C		62.81		mJ
Temperature under switching conditions	T _{vjop}		-40		150	°C

NTC-Thermistor

Table 1. Electrical Characteristics

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Rated resistances	R ₂₅	T _C =25°C, ±5%		5		KΩ
B-value	R _{25/50}	±1%		3380		K
Deviation of R100	ΔR/R	T _C =100°C, R100=493.3Ω	-5		5	%
Power dissipation	P ₂₅				20	mW

Module

Table 1. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Isolation test voltage	V _{ISOL}	RMS, f=50Hz, t=60s	2500			V
Maximum junction temperature	T _{Jmax}				150	°C
Storage temperature	T _{stg}		-40		125	°C
Operating junction temperature	T _{J op}		-40		150	°C
Stray inductance	L _{CE}			20		nH
Module lead resistance, terminals -chip	R _{CC'+EE'}			1.00		mΩ
Mounting torque for module mounting	M		3.0		6.0	Nm
Weight	W			340		g

Electrical Characteristics (curves)

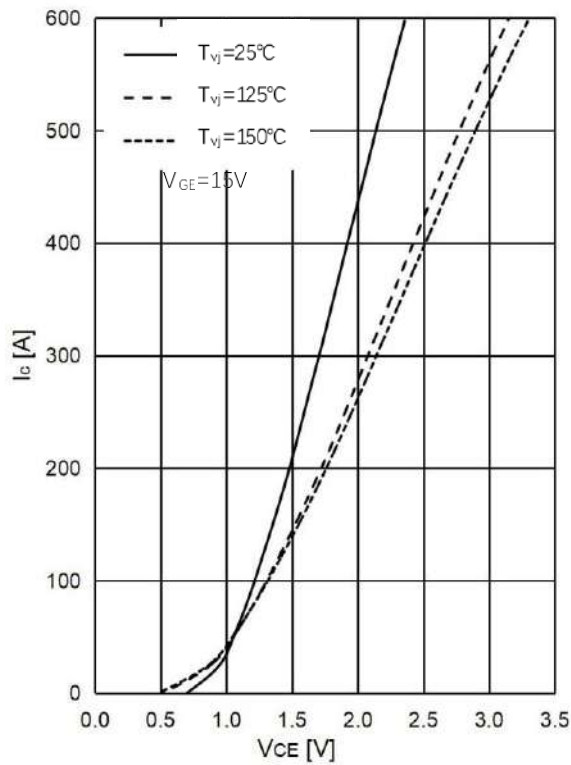


Fig 1. IGBT Output Characteristic, Inverter

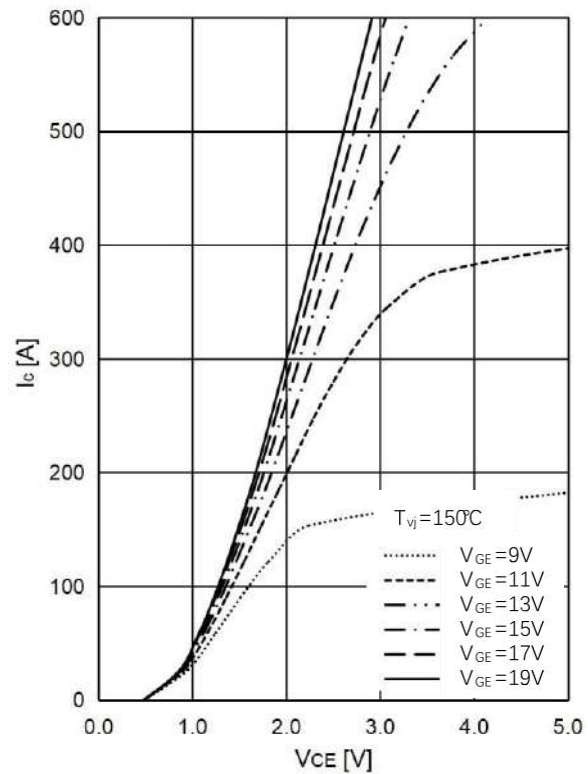


Fig 2. IGBT Output Characteristic, Inverter

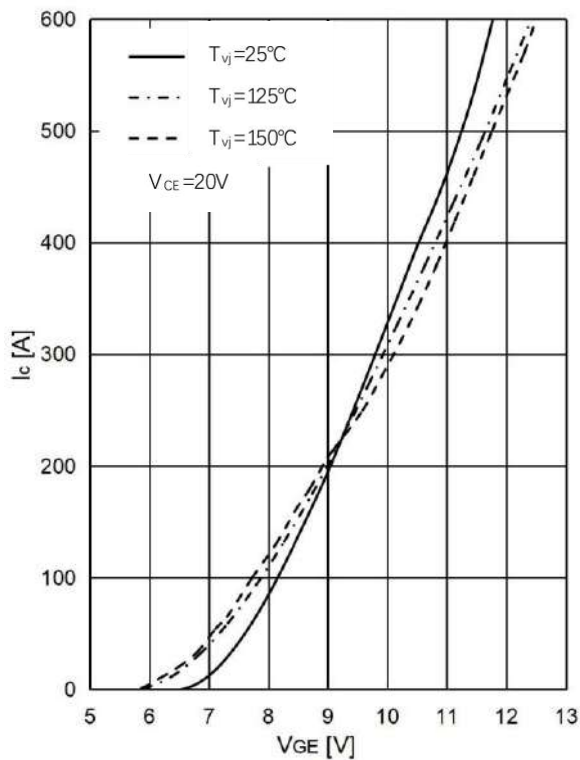


Fig 3. IGBT Transfer Characteristic, Inverter

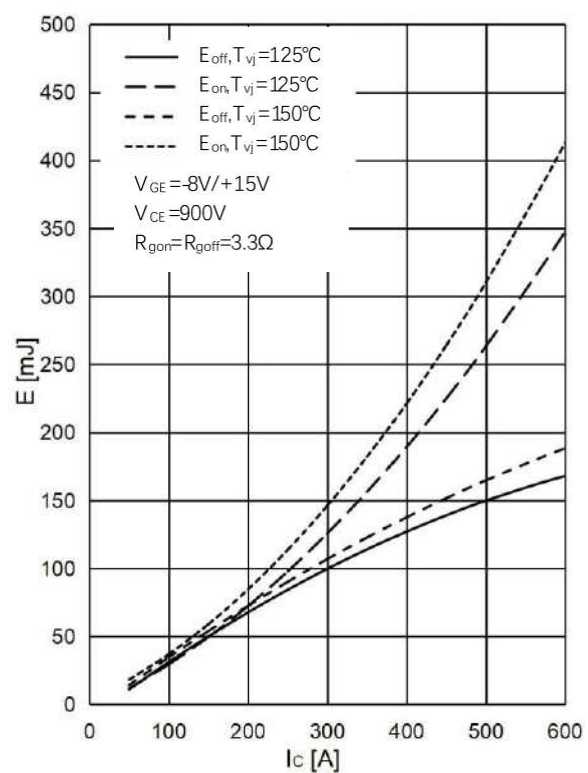


Fig 4. IGBT Switching Loss E_{on} & E_{off} vs. I_c , Inverter

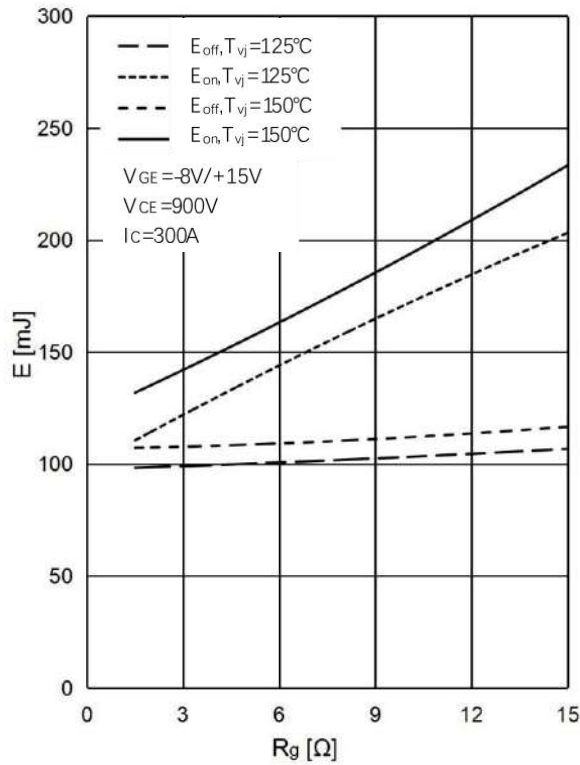


Fig 5. IGBT Switching Loss E_{on} & E_{off} vs. R_G , Inverter

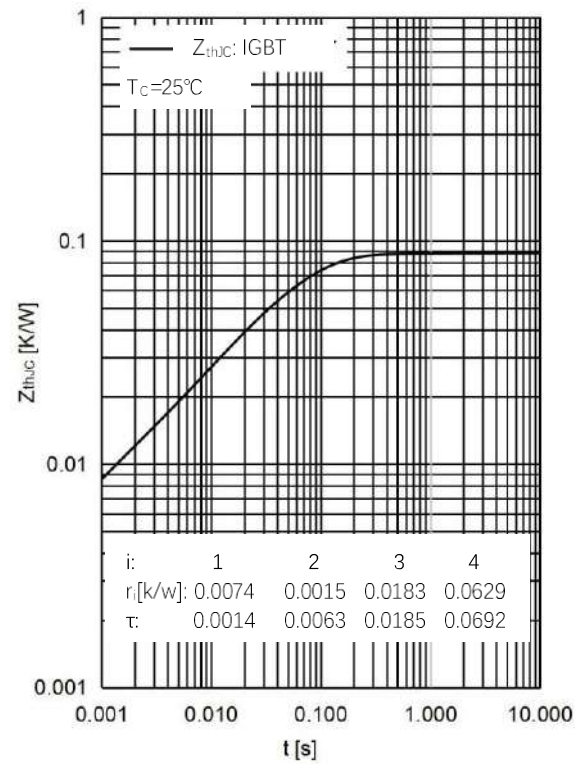


Fig 6. IGBT Transient thermal impedance, Inverter

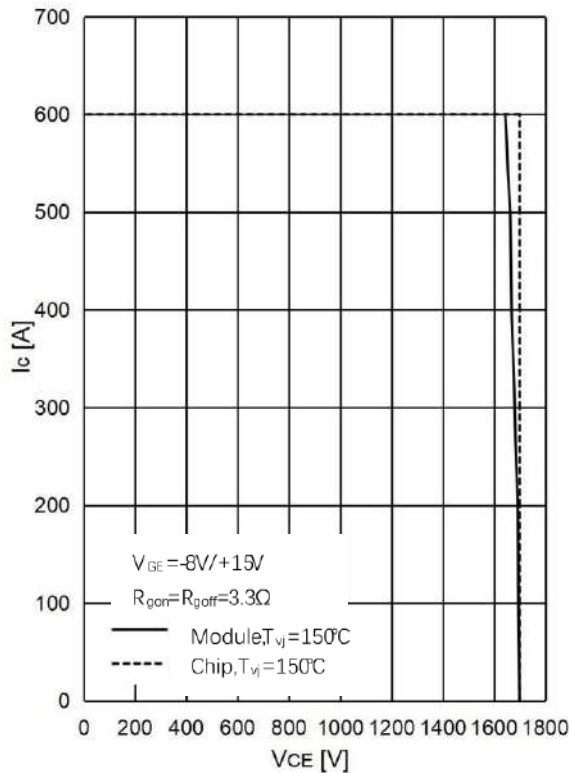


Fig 7. IGBT RBSOA, Inverter

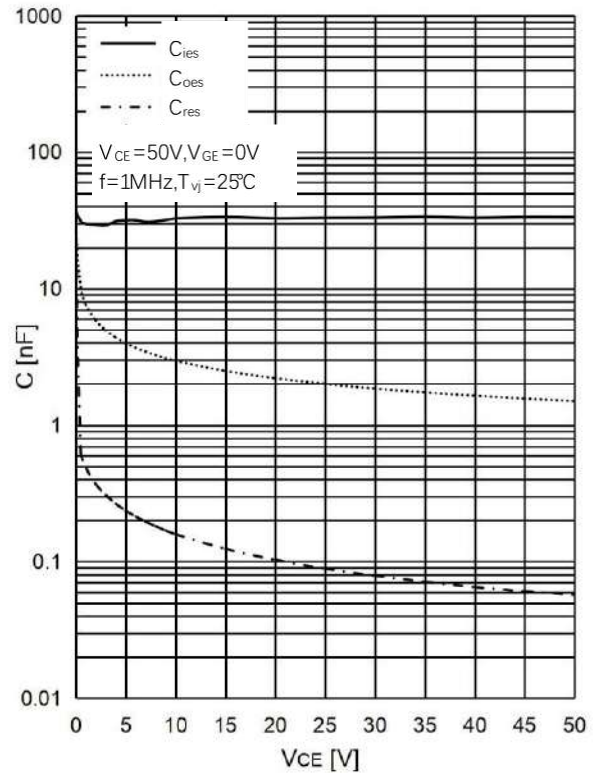


Fig 8. IGBT Capacity Characteristic Inverter

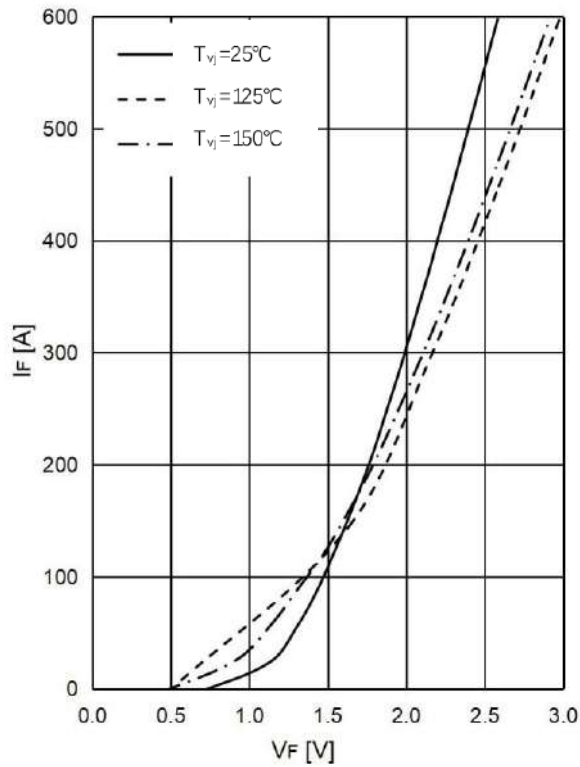


Fig 9. Diode Forward characteristic, Inverter

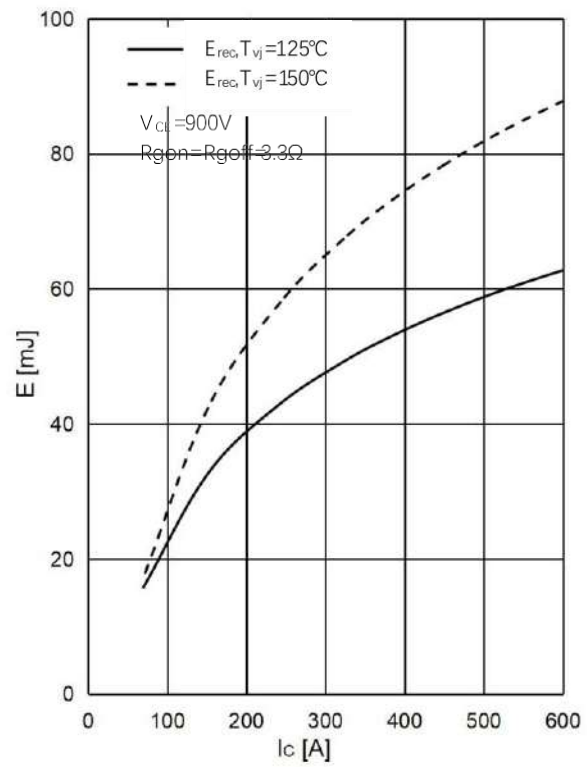


Fig 10. Diode Switching Loss E_{rec} vs. I_F , Inverter

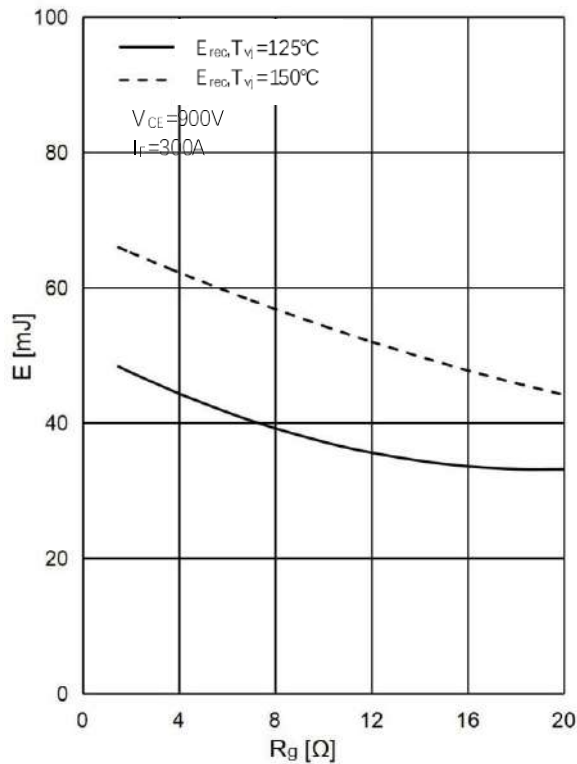


Fig 11. Diode Switching Loss E_{rec} vs. R_G , Inverter

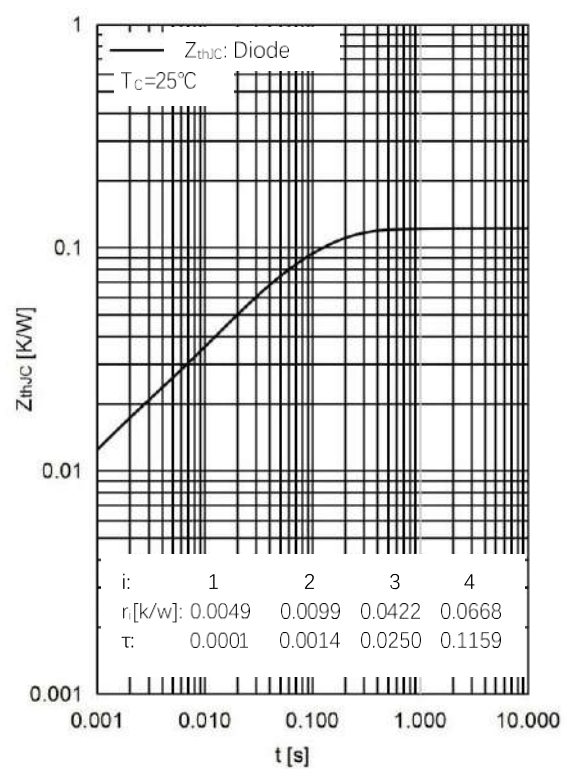


Fig 12. Diode Transient thermal impedance, Inverter

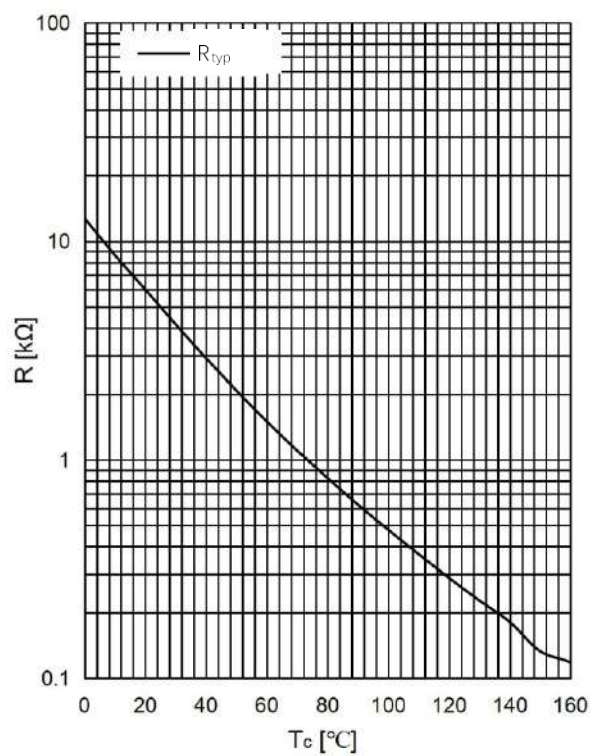
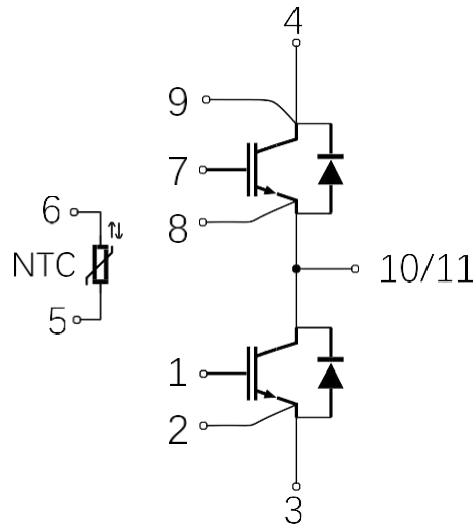


Fig 13. NTC-Thermistor-temperature characteristic

Circuit Diagram



Package Dimensions

