AMG450G1200MED

1200V 450A IGBT Module

Features

- 1200V 450A, $V_{CE(sat)}$=1.55V @25°C
- MPT Gate Technology
- Low Losses
- High RBSOA capability
- Low reverse-recovery loss

Typical Applications

- Motor Drives
- Solar Applications
- UPS Systems
- Energy Storage

Product summary

V_{CES}	1200V
I_C	450A

Equivalent Circuit Schematic

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage, T_{vj}=25°C	1200	V
V_{GES}	Gate-emitter voltage	±20	V
I_C	Collector current, DC, T_C=100°C,T_{vj}=175°C	450	A
I_{CRM}	Repetitive peak collector current	900	A
T_{SC}	Short circuit withstand time, V_{GE}=15V/-8V, V_{CC}=600V, T_{vj}=150°C	8	μs
T_{stg}	Storage Temperature Range	-40 to +125	°C
T_{vJop}	Temperature under switching conditions	-40 to +150	°C

IGBT Electrical Characteristics

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C=450A, V_{GE}=15V, T_{vj}=25°C		1.4	1.55	1.70	V
		I_C=450A, V_{GE}=15V, T_{vj}=150°C			1.85		
I_{CES}	Collector-emitter cut-off	V_{CE}=1200V, V_{GE}=0V,T_{vj}=25°C				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=20V, V_{CE}=0V, T_{vj}=25°C				500	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE}=V_{GE}, I_D=18mA, T_{vj}=25°C		5.0	6.0	7.0	V
R_{Gint}	Internal Gate Resistir	T_{vj}=25°C			0.6		Ω
C_{ies}	Input Capacitance	V_{CE}=25V, f=100KHz, V_{GE}=0V			100		nF
C_{oes}	Output Capacitance				1.5		
C_{res}	Reverse Transfer Capacitance				0.28		
E_{on}	Turn-on energy loss per pulse	V_{CC}=600V, V_{GE}=-8V/15V I_C=450A, R_{GON}=1.5Ω R_{GOFF}=2.4Ω Load=35nH	T_{vj}=25°C		24.6		mJ
			T_{vj}=125°C		39.5		
			T_{vj}=150°C		45.5		
E_{off}	Turn-off energy loss per pulse		T_{vj}=25°C		35.0		mJ
			T_{vj}=125°C		46.3		
			T_{vj}=150°C		48.8		
Q_G	Gate Charge	V_{GS}=±15V			3.3		uC

td(on)	Turn-on delay time	V_{CE}=600V, V_{GS}=-8V/+15V I_C=450A, R_{GON}=1.5Ω R_{GOFF}=2.4Ω	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		160 162 164		ns
tr	Rise time		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		47 52 53		
td(off)	Turn-off delay time		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		522 580 595		
tf	Fall time		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		90 190 190		
R_{thJC}	Thermal resistance, junction to case	Per IGBT			0.058		K/W

Diode Inverter
Maximum Rated Values

Symbol	Parameter	Conditions	Rating.	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25°C	1200	V
I_F	Forward current, DC		450	A
I_{FRM}	Repetitive peak forward current		900	A

Diode, Characteristic Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_F	Continuous forward voltage	I_f=600A, V_{GE}=0V	T_{vj}=25°C T_{vj}=150°C	1.5	1.87 1.84	2.40	V
Q_r	Recovery Charge	V_{GE}=-8V, I_F=450A, V_R=600V, dif/dt=5000A/us, T_{vj}=150°C	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		19.5 40.5 53.0		uC
I_{rrm}	Peak Reverse Recovery Current		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		300 332 345		A
E_{rec}	Reverse recovery energy		T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C		10.0 18.7 23.0		mJ
R_{thJC}	Thermal resistance, junction to case	Per diode			0.094		K/W

Thermal Characteristics
NTC-Thermistor

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated resistance	T_c=25°C		5.00		kΩ
ΔR/R	Deviation of R_{100}	T_c = 100°C, R_{100} = 465Ω	-7.3		7.3	%
P_{25}	Power Dissipation	T_{NTC} = 25°C			10	mW
$B_{25/50}$	B-value	$R_2 = R_{25\ exp}[B_{25/50}(1/T_2 - 1/(298,15\ K))]$		3380		k
$B_{25/80}$	B-value	$R_2 = R_{25\ exp}[B_{25/80}(1/T_2 - 1/(298,15\ K))]$		3470		k
$B_{25/100}$	B-value	$R_2 = R_{25\ exp}[B_{25/100}(1/T_2 - 1/(298,15\ K))]$		3520		k

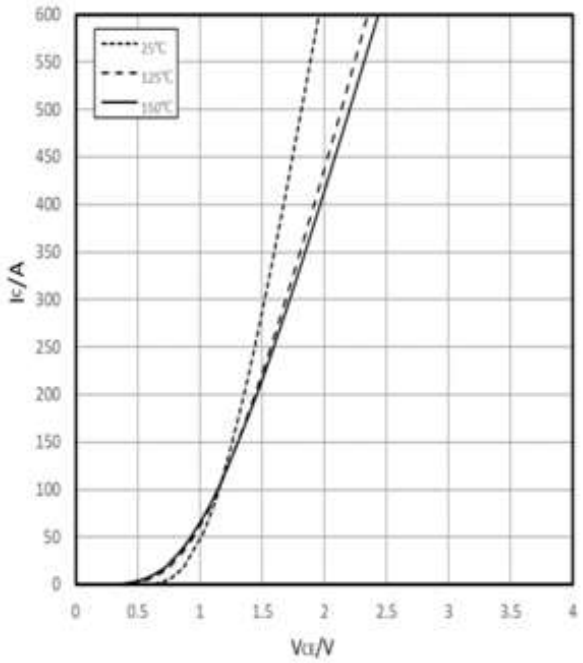
Module

Symbol	Parameter	Conditions	Rating.	Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate, RMS, f=50Hz, t=1min	2.5	KV
	Material of module baseplate		Cu	
	Internal isolation	Basic insulation	Al_2O_3	A
T_{stg}	Storage temperature		-40~125	°C

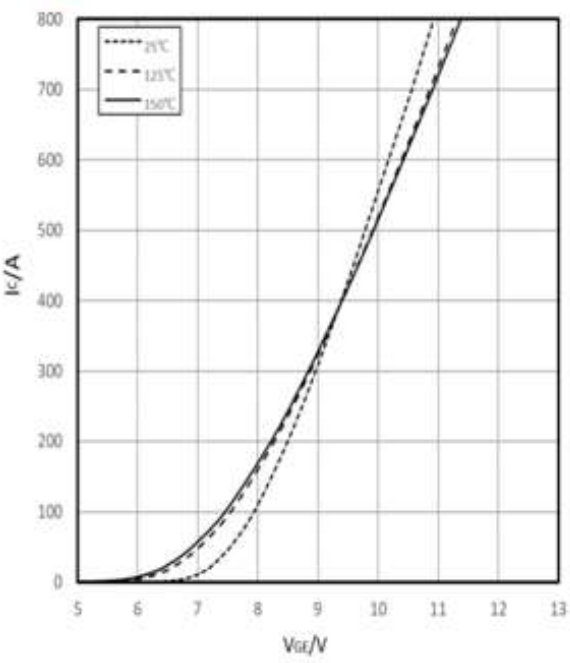
Symbol	Parameter	Test Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mounting torque for module mounting	Screw M5	3.0		6.0	Nm
LsCE	Stray inductance module			20		nH
ds	Creepage distance	Terminal to terminal		13		mm
		Terminal to base plate		14.5		
da	Clearance	Terminal to terminal		10		mm
		Terminal to base plate		12.5		
CTI	Comperative tracking index			>200		
m	Weight			345		g

Typical Performance

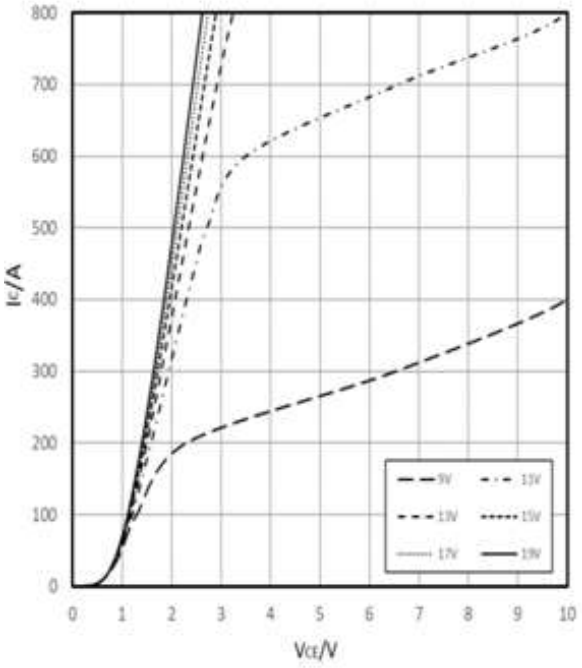
Output characteristic IGBT, Inverter(typical),
Inclusive RCC´+EE´, Ic=f(Vcc),VGE=15V



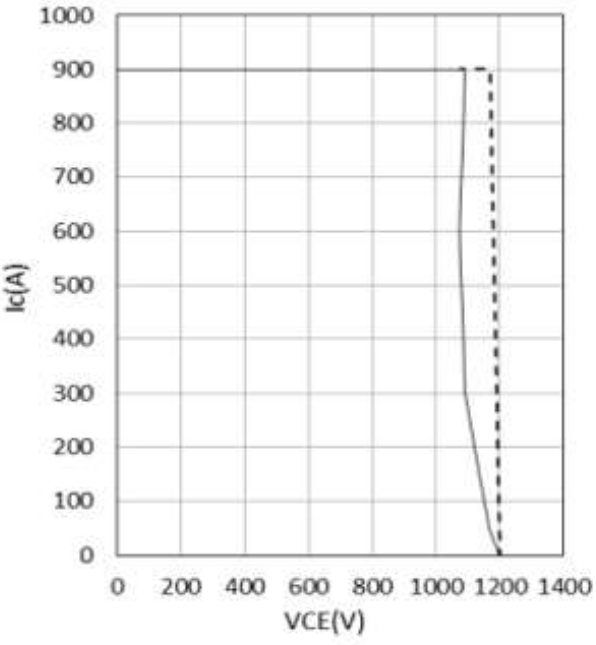
Transfer characteristic IGBT, Inverter(typical)
Ic=f(VGE), VGE=20V



Output characteristic IGBT, Inverter(typical),
Inclusive RCC´+EE´, Ic=f(VCE),TVj=150℃

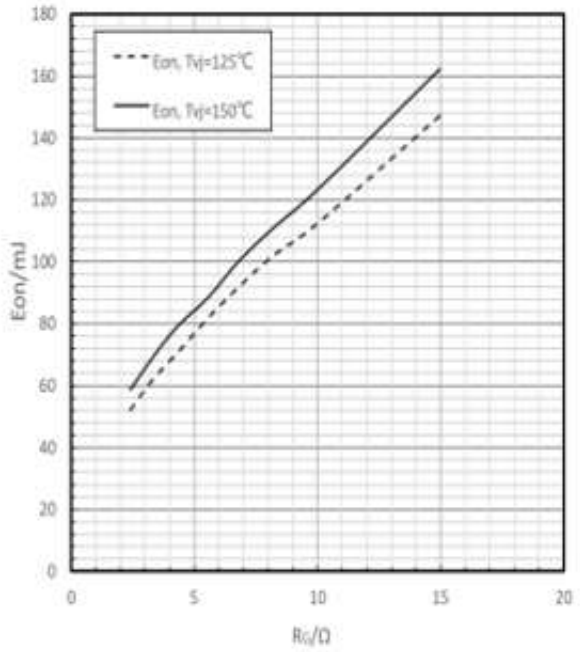


Reverse bias safe operating area IGBT, Inverter(RBSOA)
IC=f(VCE), VGE=+15V/-8V, RGoff=2.4Ω, TVj=150℃



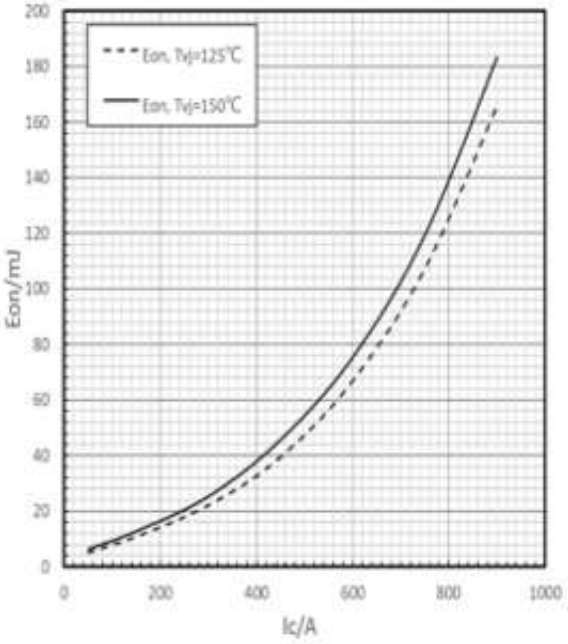
Turn-on loss IGBT, Inverter(typical)

Eon=f(R_g), V_{GE}=+15V/-8V, I_C=450A， V_{CC}=600V



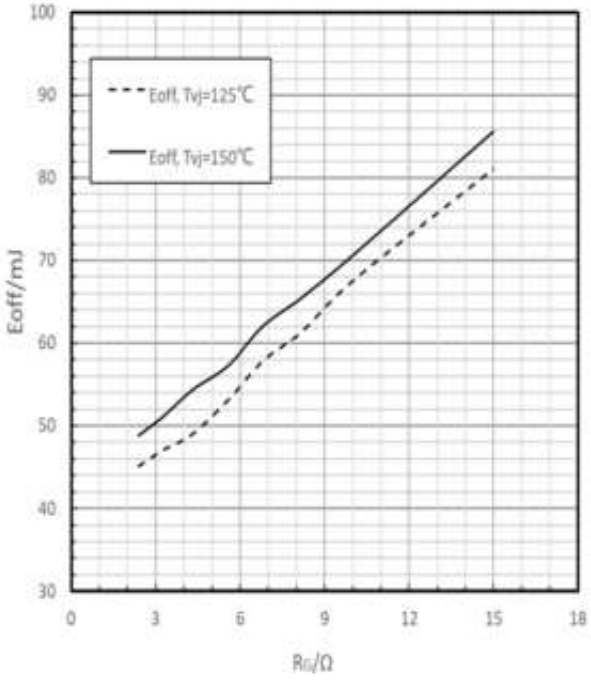
Turn-on loss IGBT, Inverter(typical)

Eon=f(I_C), V_{GE}=+15V/-8V, R_{Gon}=1.5Ω， V_{CC}=600V



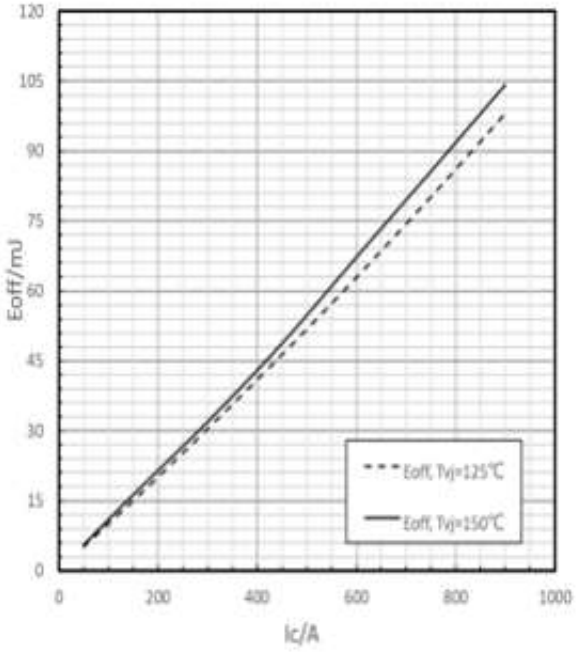
Turn-off loss IGBT, Inverter(typical)

Eoff=f(R_g), V_{GE}=+15V/-8V, I_C=450A， V_{CC}=600V



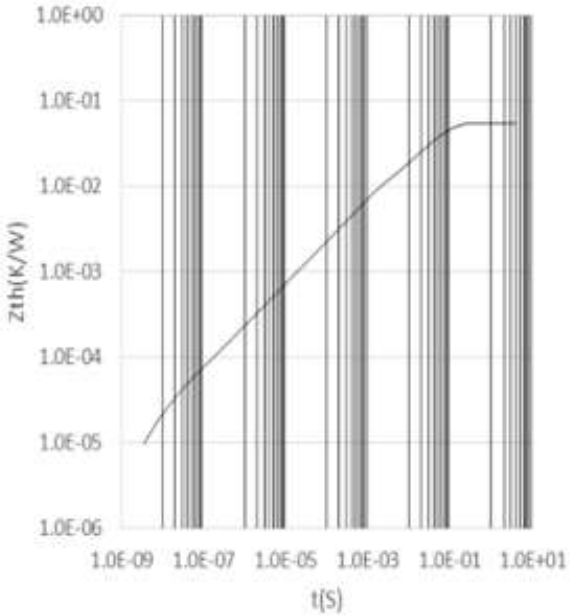
Turn-off loss IGBT, Inverter(typical)

Eon=f(I_C), V_{GE}=+15V/-8V, R_{Goff}=2.4Ω， V_{CC}=600V



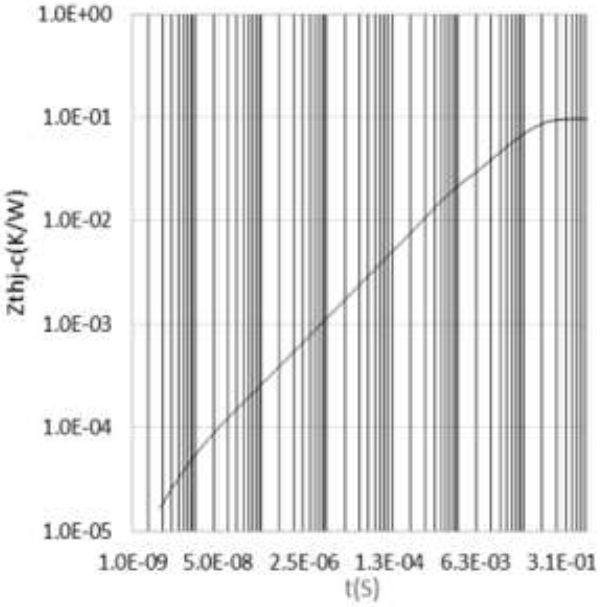
Transient thermal impedance IGBT, Inverter

$Z_{thJC}=f(t)$



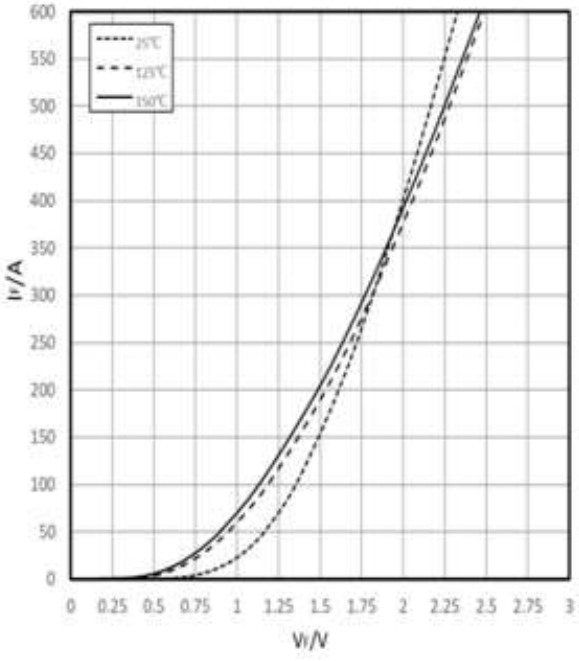
Transient thermal impedanceFRD, Inverter

$Z_{thJC}=f(t)$



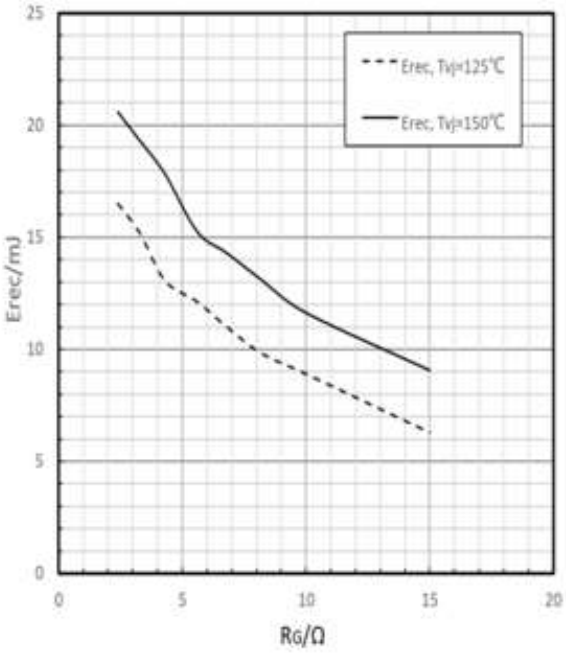
Output characteristic FRD, Inverter(typical) Inclusive RCC´+EE˝

$I_F=f(V_F)$



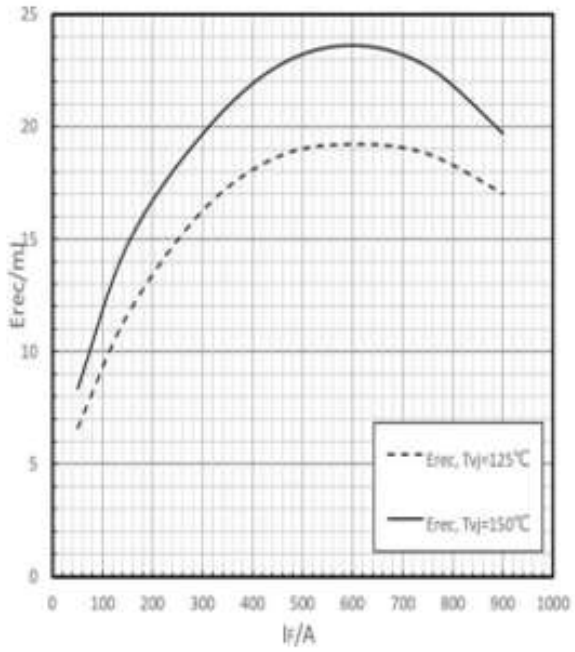
Switching loss FRD, Inverter, (typical)

$E_{rec}=f(RG)$, $I_F=450A$, $V_{CE}=600V$



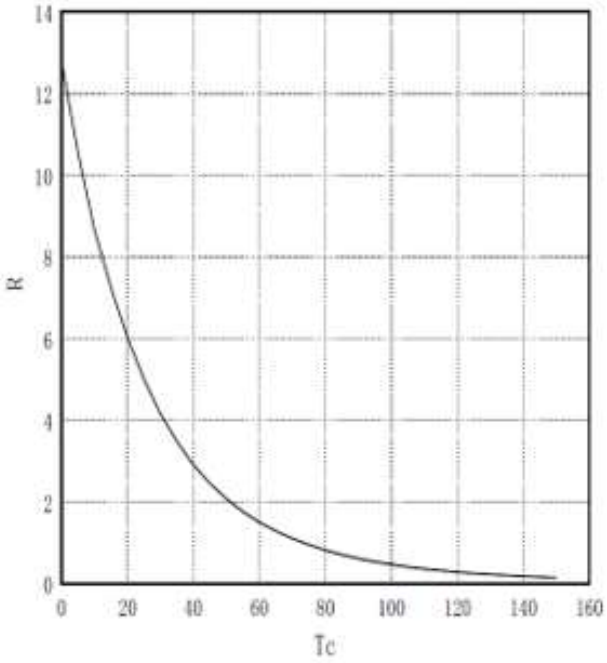
Switching losses FRD, Inverter(typical)

$E_{rec}=f(I_F)$, $R_{GON}=1.5\Omega$, $V_{CE}=600V$

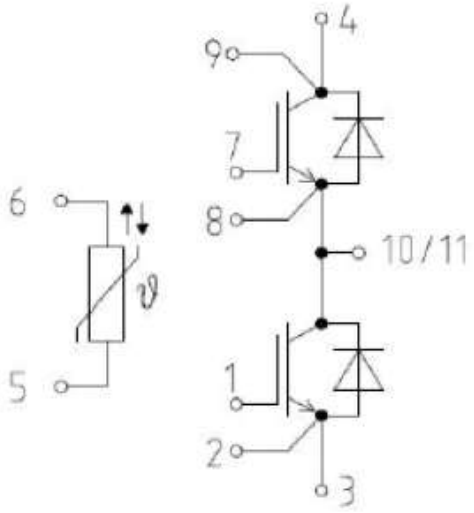


NTC- thermistor-temperature characteristic(typical)

R=f(T)



Circuit Diagram Headline



Package outlines (Unit: mm)