



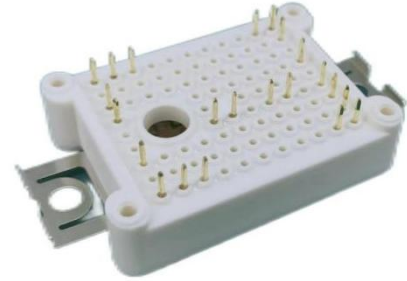
JLFF10B120RE1E7SN

LE1 PACK module with Trench/Fieldstop IGBT and Emitter Controlled diode and NTC



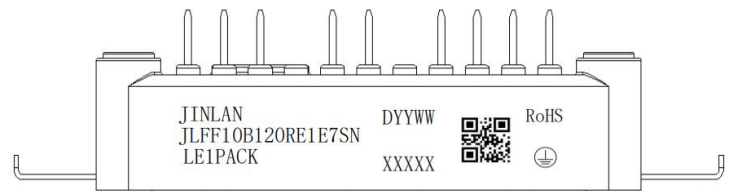
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Low inductance case
- Al₂O₃ substrate with low thermal resistance
- Solder Contact Technology
- Rugged mounting due to integrated mounting clamps



LE1 Pack

MARKING DIAGRAM

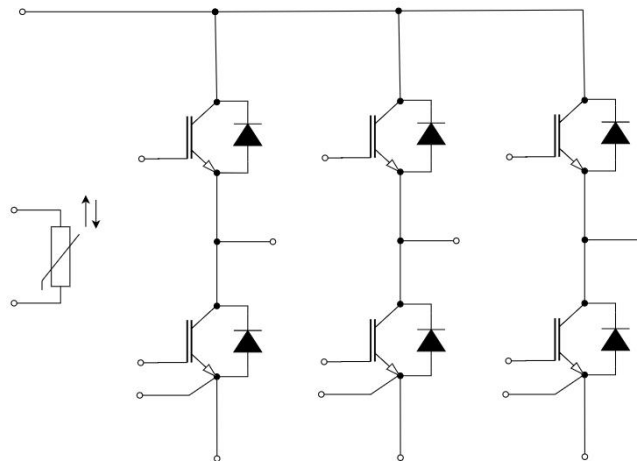


Typical Applications

- AC motor control
- Motion/servo control
- Inverter and power supplies

JINLAN	= Company Name
JLFF10B120RE1E7SN	= Specific Device Code
DYYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly Information

Description





Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V _{ISOL}	RMS,f=50Hz,t=60s	2.5	kV
Internal isolation		basic insulation(class 1,IEC 61140)	Al ₂ O ₃	
Creepage distance	d _{creep}	terminal to heatsink	11.5	mm
Creepage distance	d _{creep}	terminal to terminal	6.3	mm
Clearance	d _{clear}	terminal to heatsink	10	mm
Clearance	d _{clear}	terminal to terminal	5	mm
Comparative tracking index (electrical)	CTI		>200	
RTI Elec.	RTI	housing	140	℃

Package Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray Inductance	LCE		--	30	--	nH
Storage Temperature Range	T _{STG}		-40		125	℃
Mountig force per clamp	F		20	--	50	N
Weight	G		--	24	--	g



IGBT

Absolute Maximum Ratings (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{CES}	Collector-Emitter Voltage	1200	V
V _{GES}	Gate-Emitter Voltage	±25	V
I _C	Collector Current @ T _c =25°C	20	A
	Collector Current @ T _c =100°C	10	A
I _{CM}	Pulsed Collector Current, t _p limited by T _{vj max}	20	A

Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} = 15 V, I _C = 10 A, T _{vj} = 25°C	--	1.50	2.20	V
		V _{GE} = 15 V, I _C = 10 A, T _{vj} = 125°C	--	1.70	--	
		V _{GE} = 15 V, I _C = 10 A, T _{vj} = 150°C	--	1.75	--	
V _{GE(TH)}	Gate-Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 250μA, T _{vj} = 25°C	5.0	6.0	7.0	V
I _{CES}	Collector-Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} = V _{CES} , T _{vj} = 25°C	--	--	200	μA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0 V, T _{vj} = 25°C	--	--	200	nA
R _{Gint}	Internal Gate Resistance		--	0.8	--	Ω
C _{ies}	Input Capacitance	V _{CE} =25V, f=1MHz, V _{GE} =0V		1610		pF
C _{oes}	Output capacitance		--	88.7	--	pF
C _{res}	Reverse Transfer		--	14.8	--	pF
Q _G	Gate Charge	V _{GE} =15V, I _C =10A	--	60.7	--	nC
t _{d(on)}	Turn-On Delay Time	V _{CC} = 600 V, I _C = 10 A R _{Gon} = 10Ω, R _{Goff} = 25Ω , V _{GE} = ±15V Inductive Load T _{vj} = 25°C	--	60	--	ns
t _r	Rise Time		--	20	--	
t _{d(off)}	Turn-off Delay Time		--	110	--	
t _f	Fall Time		--	47	--	
E _{on}	Turn-On Switching Loss per Pulse		--	0.495	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	0.305	--	
t _{d(on)}	Turn-On Delay Time	V _{CC} = 600 V, I _C = 10 A R _{Gon} = 10Ω, R _{Goff} = 25Ω , V _{GE} = ±15V Inductive Load T _{vj} = 150°C	--	TBD	--	ns
t _r	Rise Time		--	TBD	--	
t _{d(off)}	Turn-off Delay Time		--	TBD	--	
t _f	Fall Time		--	TBD	--	
E _{on}	Turn-on Switching Loss per Pulse		--	0.770	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	0.425	--	
I _{SC}	SC Data	t _p ≤10μs, V _{GE} ≤15V, T _{vj} =150°C, V _{CC} =800V, V _{CEmax} =V _{CES} -L _{sCE} ·di/dt	--	35	--	A
R _{thJC}	Thermal resistance	Junction-to-Case (per IGBT)	--	0.915	--	K/W
T _{vj op}		Temperature under switching conditions	-40		175 ¹⁾	°C

¹⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.



Diode

Absolute Maximum Ratings (T_C = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	10	A
I _{FM}	Diode Maximum Forward Current t _p =1ms	20	A

Characteristics (T_C=25°C unless otherwise noted)

V _F	Diode Forward Voltage	I _F = 10A, V _{GE} =0V, T _{vj} = 25°C	--	1.85		V
		I _F = 10A, V _{GE} =0V, T _{vj} = 125°C	--	1.75	--	
		I _F = 10A, V _{GE} =0V, T _{vj} = 150°C	--	1.70	--	
Q _r	Recovered Charge	V _R =600V, I _F =10A, R _{Gon} = 10Ω, R _{Goff} = 25Ω, V _{GE} = ±15V , T _{vj} = 25°C	--	0.214	--	μC
I _{RM}	Peak Reverse Recovery Current		--	5.22	--	A
T _{rr}	Reverse Recovery Time		--	27.5	--	ns
E _{rec}	Reverse Recovery Energy		--	0.090	--	mJ
Q _r	Recovered Charge	V _R =600V, I _F =10A, R _{Gon} = 10Ω, R _{Goff} = 25Ω, V _{GE} = ±15V , T _{vj} = 150°C	--	0.495	--	μC
I _{RM}	Peak Reverse Recovery Current		--	7.97	--	A
T _{rr}	Reverse Recovery Time		--	42.9	--	ns
E _{rec}	Reverse Recovery Energy		--	0.291	--	mJ
R _{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	1.52	--	K/W
T _{vj op}		Temperature under switching conditions	-40		175 ²⁾	°C

²⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

NTC Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R ₂₅	Rated Resistance		--	5.0	--	kΩ
ΔR/R	Deviation of R100	T _C =100 °C, R ₁₀₀ =493.3Ω	-5	--	5	%
P ₂₅	Power Dissipation		--	--	20.0	mW
B _{25/50}	B-value	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ - 1/(298.15K))]	--	3375	--	K
B _{25/80}	B-value	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ - 1/(298.15K))]	--	3411	--	K
B _{25/100}	B-value	R ₂ =R ₂₅ exp[B _{25/100} (1/T ₂ - 1/(298.15K))]	--	3433	--	K



Figure1.output characteristic IGBT,Inverter(typical)
 $T_{vj}=25^{\circ}\text{C}$

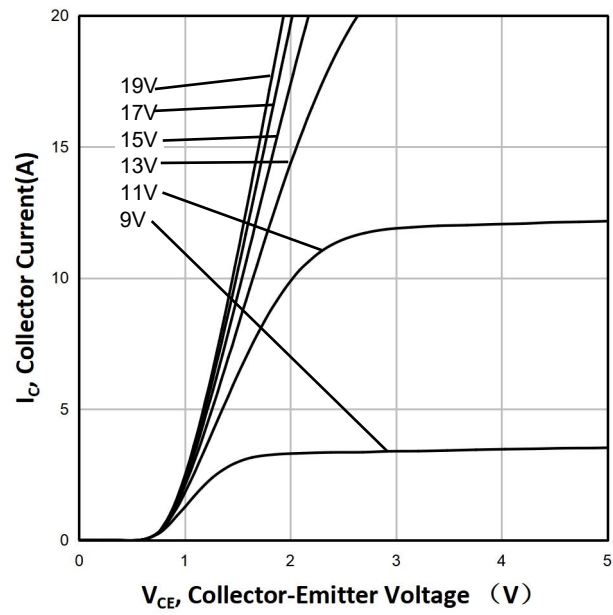


Figure2.output characteristic IGBT,Inverter(typical)
 $T_{vj}=150^{\circ}\text{C}$

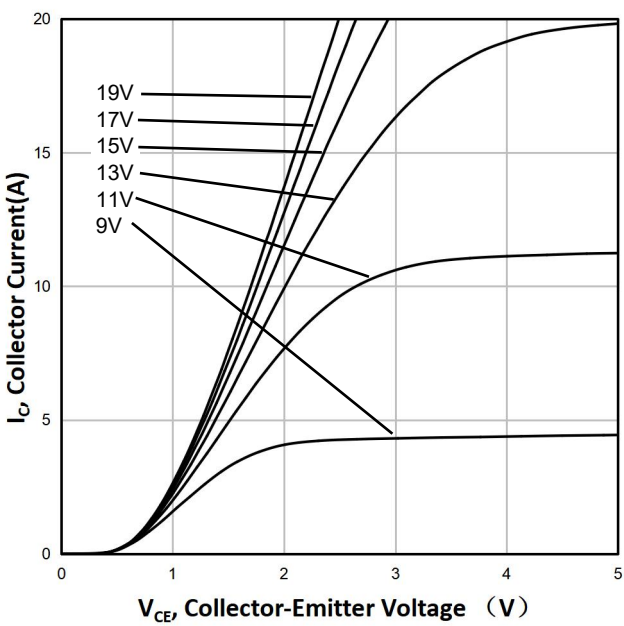


Figure3. $V_{CE(sat)}$ vs. Temperature

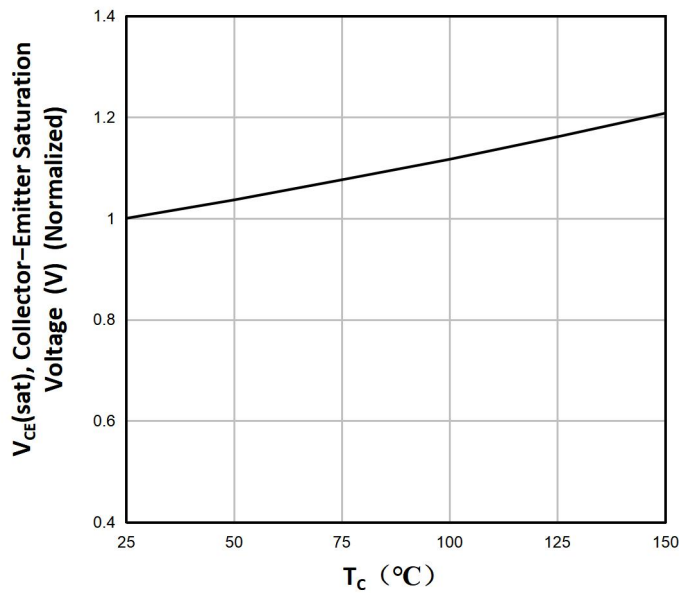


Figure4.transfer characteristic IGBT,Inverter(typical)
 $V_{CE}=20\text{V}$

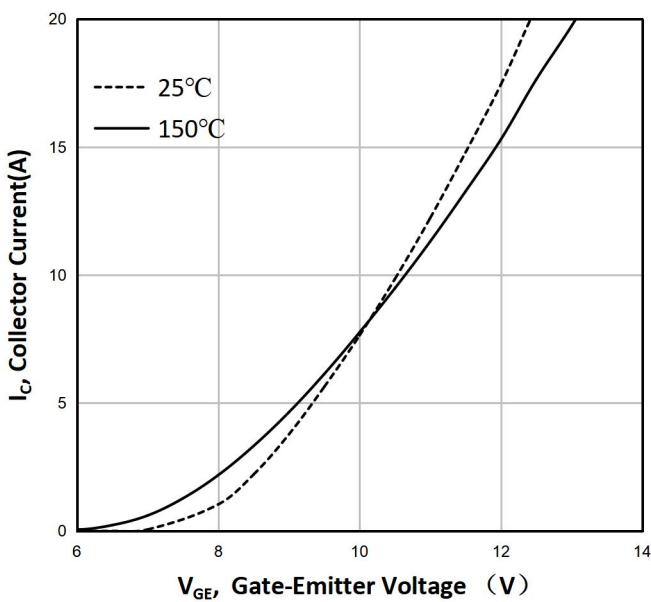




Figure5. V_{TH} vs. Temperature

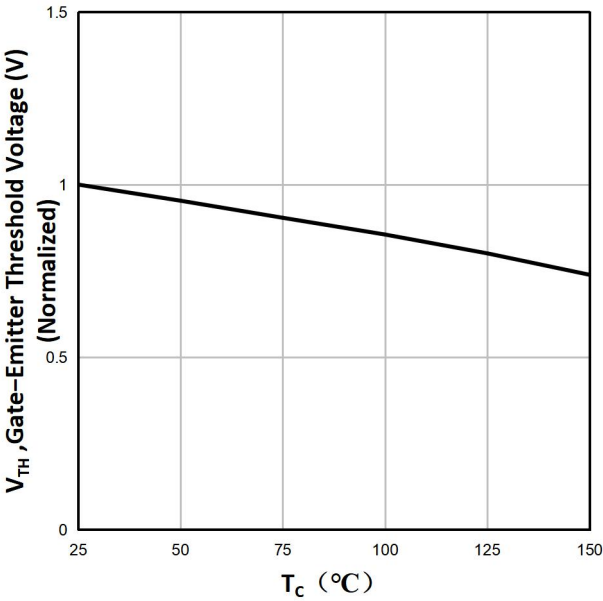


Figure6. Gate Charge Waveform

$V_{cc}=600V$

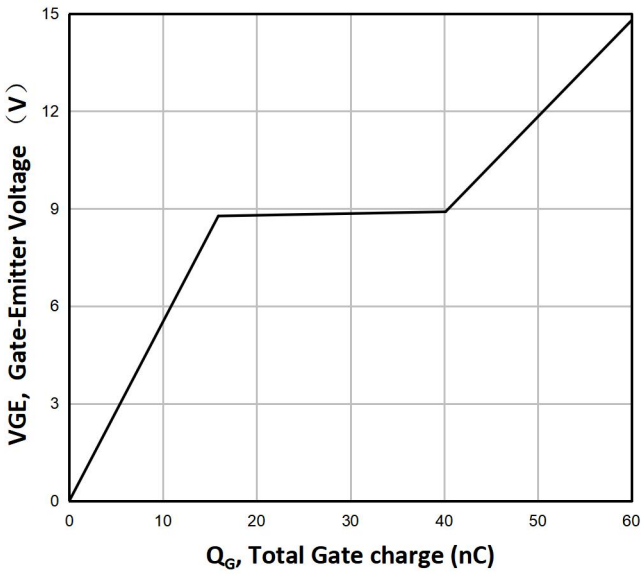


Figure7. Saturation Voltage vs. V_{GE}

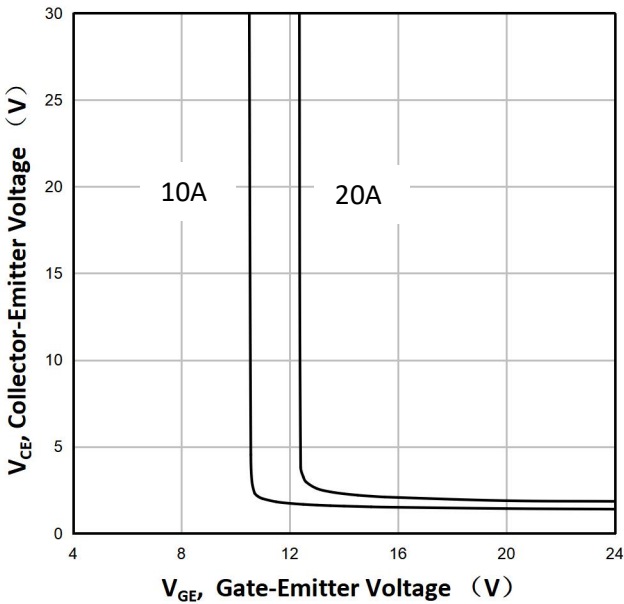
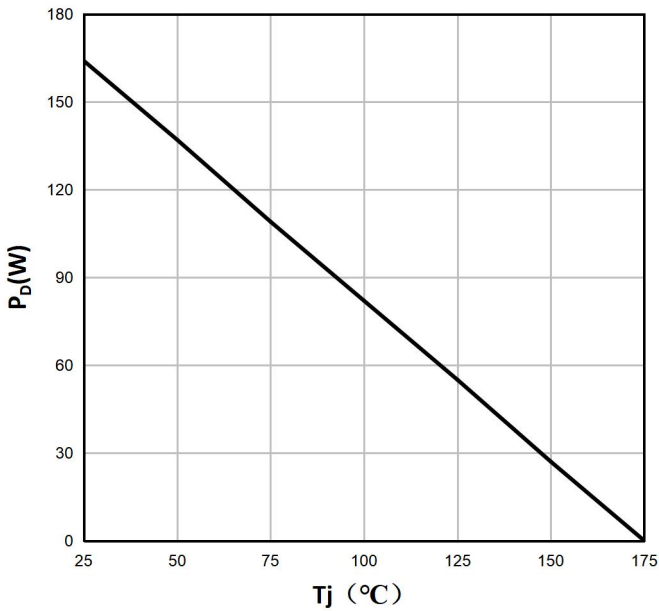


Figure8. P_{tot} vs. Case Temperature



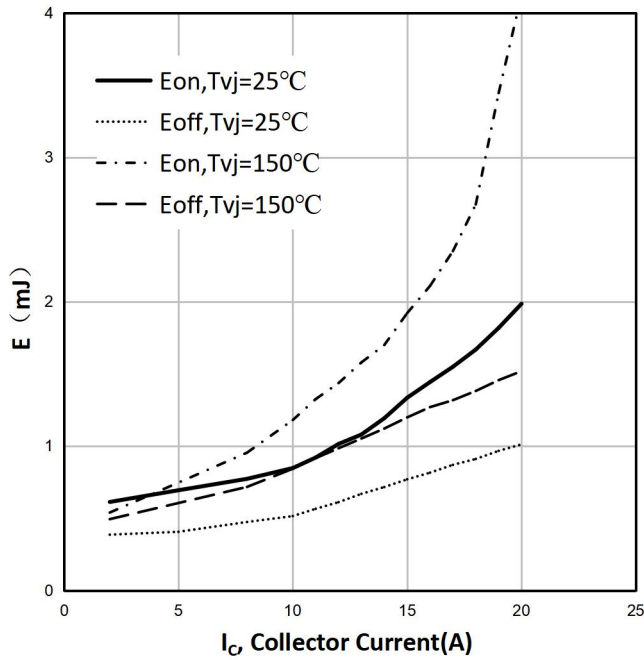
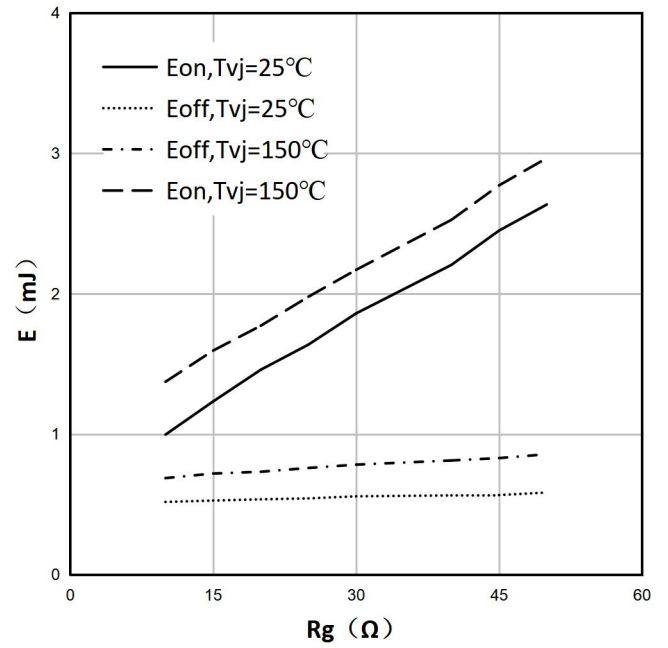
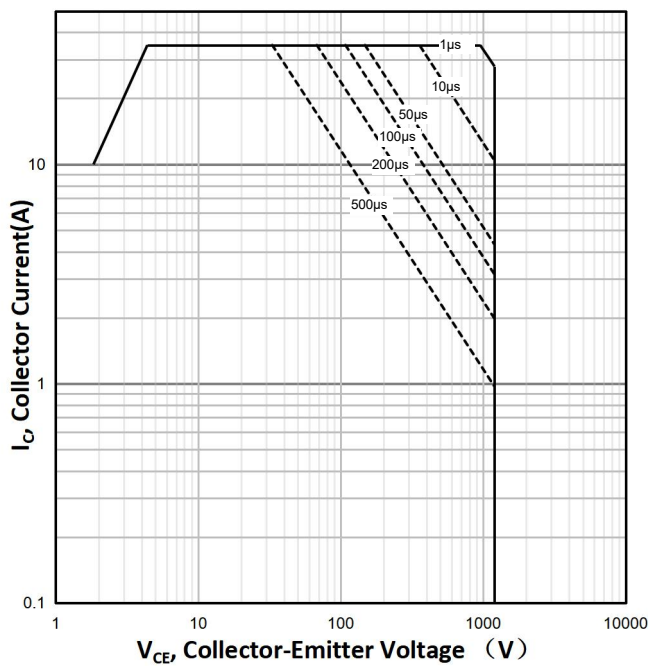
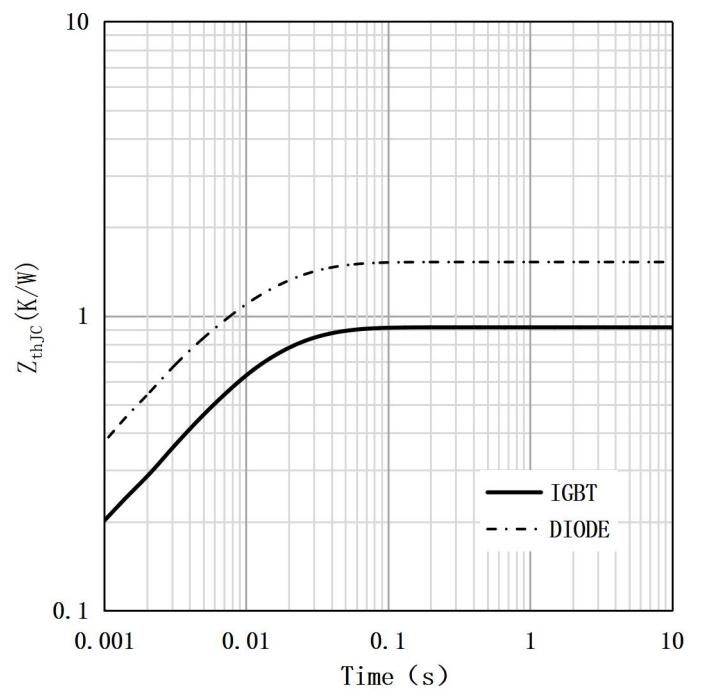
**Figure9.switching losses IGBT,Inverter(typical)** $V_{cc}=600V, R_{gon}=10\Omega, R_{goff}=25\Omega, V_{ge}=15V/-5V$ **Figure10.switching losses IGBT,Inverter(typical)** $V_{cc}=600V, I_C=10A, V_{ge}=15V/-5V$ **Figure11.FBSOA IGBT** $D=0, T_c=25^\circ C, T_j \leq 175^\circ C, V_{ge}=15V$ **Figure12.transient thermal impedance**



Figure13.forward characteristic of Diode,Inverter(typical)
 $V_{GE}=0V$

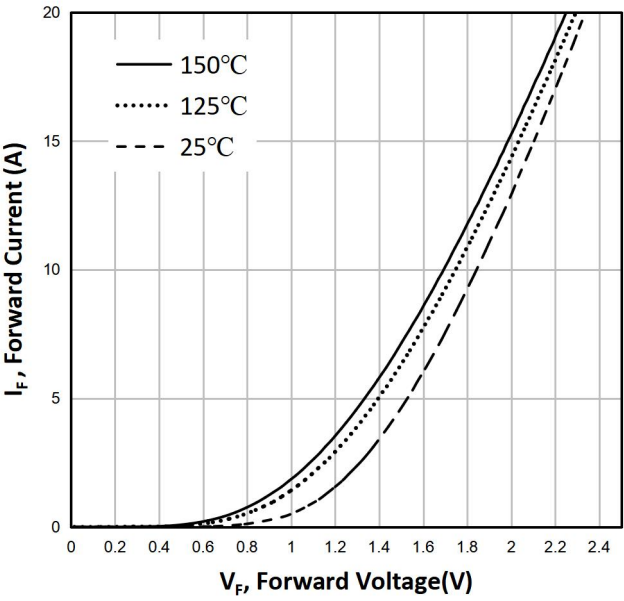


Figure 14.Reverse Recovery Energy Loss vs. I_C
 $V_{CC}=600V, R_{gon}=10\Omega, R_{goff}=25\Omega, V_{ge}=15V/-5V$

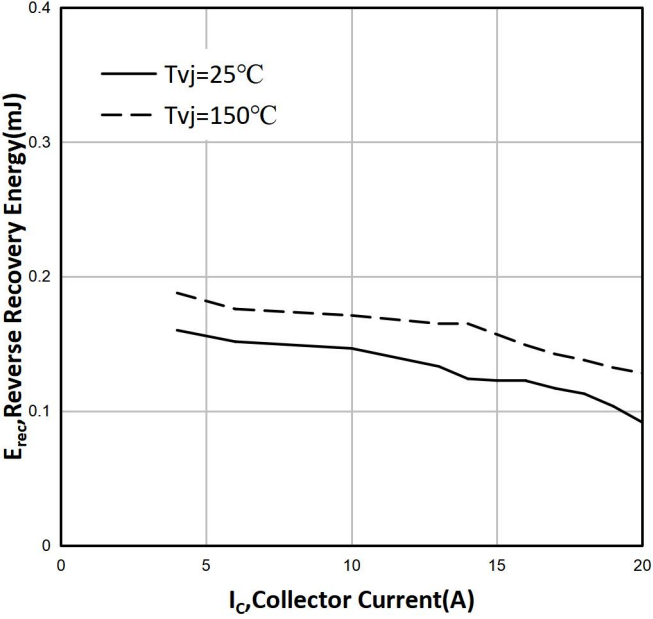


Figure 15.Reverse Recovery Energy Loss vs. R_G
 $V_{CE}=600V, R_G=10\Omega$

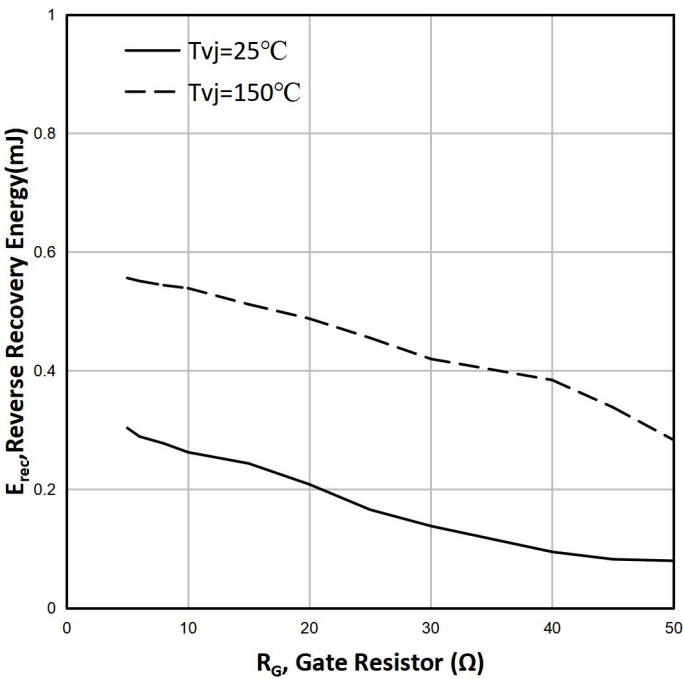
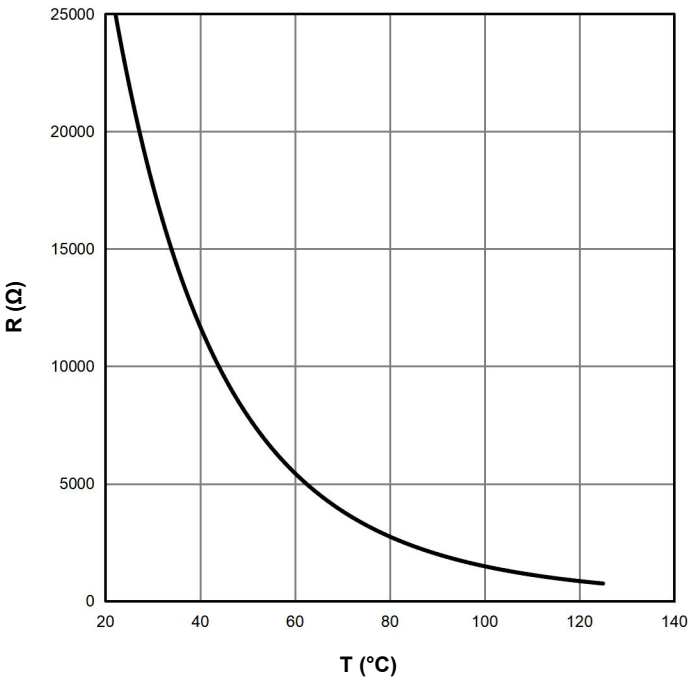
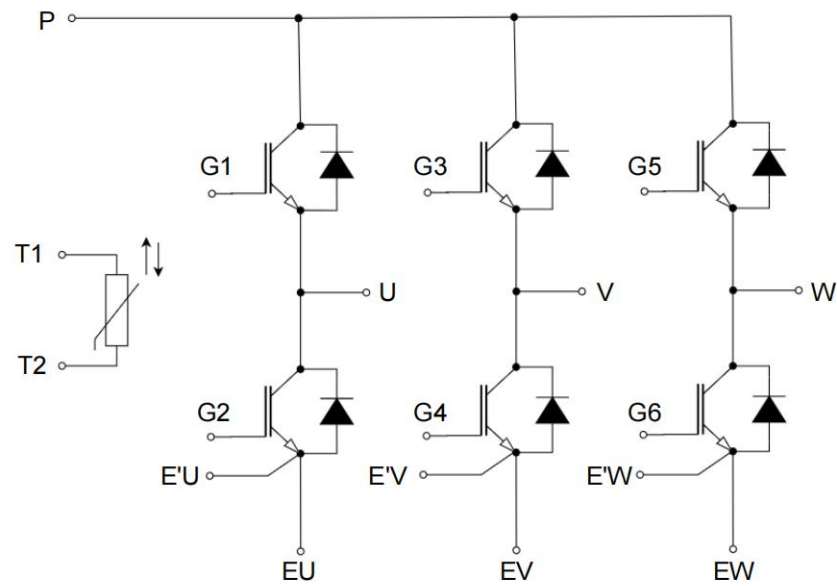


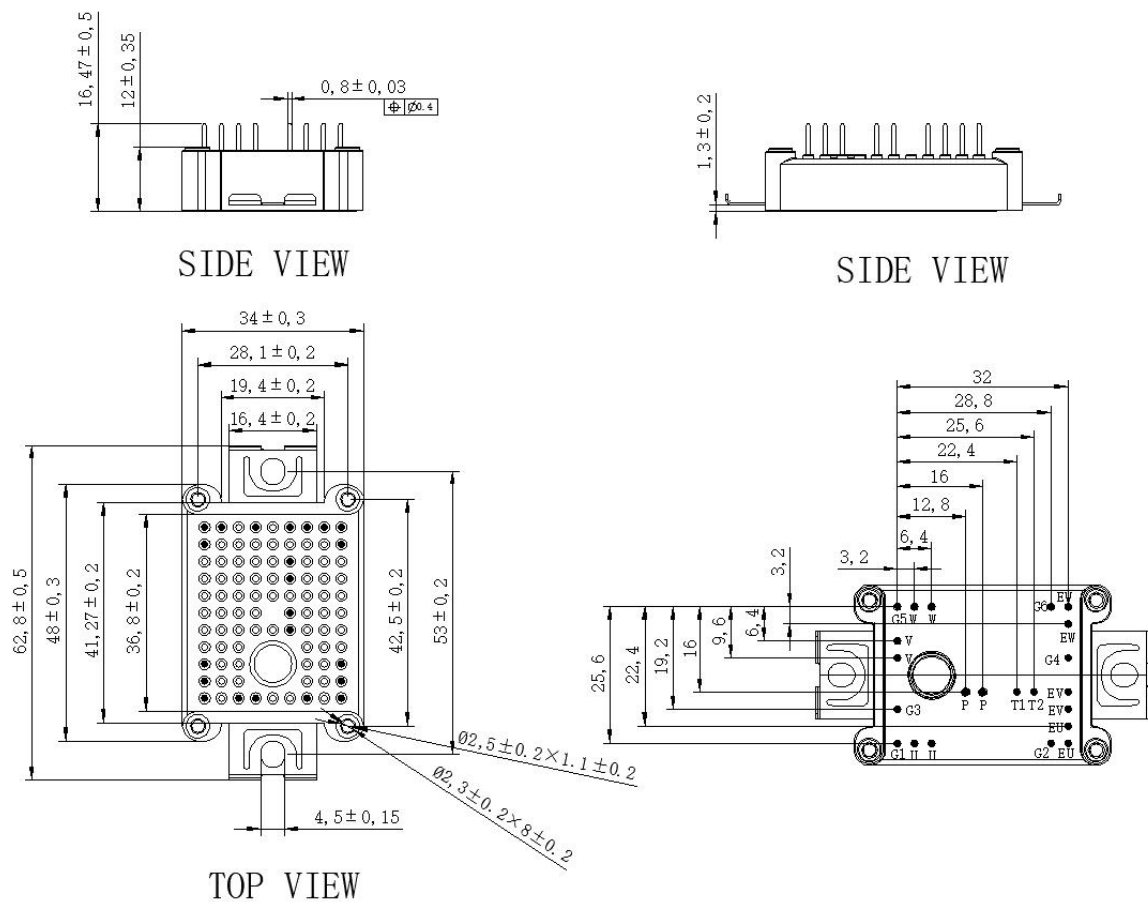
Figure16.NTC-Thermistor-temperature characteristic(typical)



CIRCUIT DIAGRAM



PACKAGE DIMENSION





REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2024-12-24	Preview



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