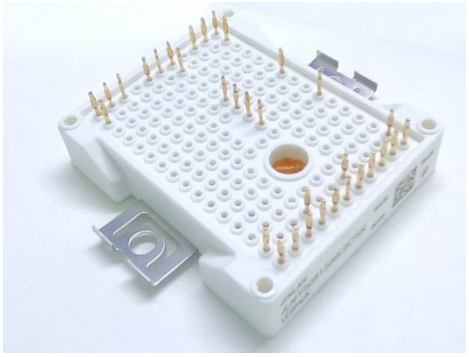
JLAFF50B120RE2E7PN

LE2 PACK module with Trench/Fieldstop IGBT and Emitter Controlled diode and Pressfit/NTC

RoHS

Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Overload operation up to 175℃
- Low inductance case
- Isolated heatsink using DBC technology
- Pressfit contact technology



LE2 Pack

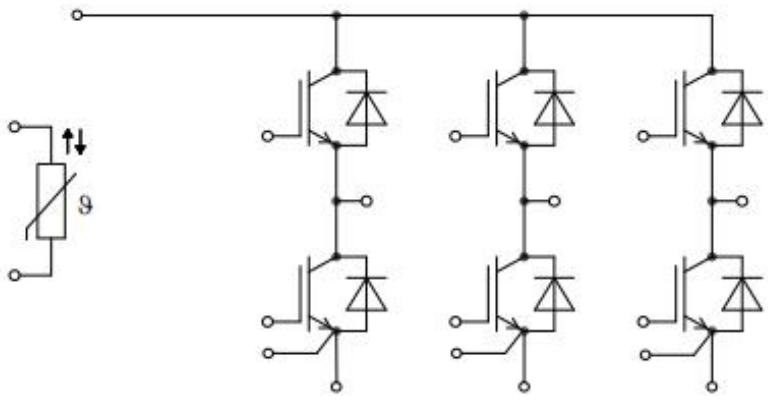
MARKING DIAGRAM

JINLAN	= Company Name
JLAFF75B120RE2E7SN	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly Information

Typical Applications

- Servo drives
- UPS systems
- Motor drives
- Air conditioning
- Auxiliary inverters

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_2O_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	

Package Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Stray Inductance	L_{CE}			--	40	--	nH
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$			--	4.00	--	mΩ
Storage Temperature Range	T_{STG}			-40		125	℃
Mounting torque for module mounting	M	-Mounting according to valid application note	M5, Screw	40		80	Nm
Weight	G				41.2		g

IGBT

Absolute Maximum Ratings (Tc = 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℃	100	A
	Collector Current @ T_C=100℃	50	A
I_{CM}	Pulsed Collector Current，t_p limited by $T_{vj\,max}$	100	A
T_{jmax}	Maximum Junction Temperature	175	℃
P_D	Power Dissipation @ T_C = 25°C	270	W
	Power Dissipation @T_C = 100 °C	108	W

IGBT Characteristics (Tc = 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 = 50 A, T_{vj} = 25°C	--	1.80	2.00	V
		V_{GE} = 15 V, I_C = 50 A, T_{vj} = 125°C	--	2.15	--	
		V_{GE} = 15 V, I_C = 50 A, T_{vj} = 150°C	--	2.30	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C = 1 mA,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
RGint	Internal Gate Resistance		--	1.27	--	Ω
Cies	Input Capacitance	V_{CE}=25V,f=1MHz,	--	5.07	--	nF
Cres	Reverse Transfer	V_{GE}=0V	--	0.13	--	nF
Q_G	Gate Charge	V_{GE}=0…+15V	--	0.19	--	μC
td(on)	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω V_{GE} =±15V Inductive Load T_{vj} = 25°C	--	110	--	ns
tr	Rise Time		--	30	--	
td(off)	Turn−off Delay Time		--	180	--	
tf	Fall Time		--	190	--	
Eon	Turn−On Switching Loss per Pulse		--	2.83	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	4.42	--	
td(on)	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω, V_{GE} =±15V Inductive Load T_{vj} = 125°C	--	120	--	ns
tr	Rise Time		--	30	--	
td(off)	Turn−off Delay Time		--	230	--	
tf	Fall Time		--	340	--	
Eon	Turn−on Switching Loss per Pulse		--	4.16	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	5.24	--	
td(on)	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω V_{GE} =±15V Inductive Load T_{vj} = 150°C	--	110	--	ns
tr	Rise Time		--	40	--	
td(off)	Turn−off Delay Time		--	240	--	
tf	Fall Time		--	330	--	
Eon	Turn−on Switching Loss per Pulse		--	4.87	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	5.49	--	
ISC	SC Data	t_P≤10μs,V_{GE} ≤15V, T_{vj} =150℃,V_{CC}=800V, V_{CEmax}=V_{CES} -L_{sCE}*di/dt	--	130	--	A
RthJC	Thermal resistance	Junction-to-Case (per IGBT)	--	0.42	--	K/W
$T_{vj\,op}$	Temperature under switching conditions		-40	--	175[1)]	℃

[1)] $T_{vj\,op}$ > 175℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode

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

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	100	A

Characteristics （Tc=25℃ unless otherwise noted）

V_F	Diode Forward Voltage	I_F = 50A, V_{GE}=0V， T_{vj} = 25°C	--	2.5	3.3	V
		I_F = 50A, V_{GE}=0V， T_{vj} = 125°C	--	2.4	--	
		I_F = 50A, V_{GE}=0V， T_{vj} = 150°C	--	2.3	--	
Qr	Recovered Charge	V_R=600V,I_F=50A, -di/dt=1100A/μs,V_{GE}=-15V T_{vj}=25℃	--	0.48	--	μC
I_{RM}	Peak Reverse Recovery Current		--	40	--	A
Trr	Reverse Recovery Time		--	16.5	--	ns
Erec	Reverse Recovery Energy		--	0.65	--	mJ
Qr	Recovered Charge	V_R=600V,I_F=50A, -di/dt=1100A/μs,V_{GE}=-15V T_{vj}=125℃	--	0.67	--	μC
I_{RM}	Peak Reverse Recovery Current		--	25	--	A
Trr	Reverse Recovery Time		--	36.5	--	ns
Erec	Reverse Recovery Energy		--	0.96	--	mJ
Qr	Recovered Charge	V_R=600V,I_F=50A, -di/dt=1100A/μs,V_{GE}=-15V T_{vj}=150℃	--	1.72	--	μC
I_{RM}	Peak Reverse Recovery Current		--	27	--	A
Trr	Reverse Recovery Time		--	42.9	--	ns
Erec	Reverse Recovery Energy		--	1.01	--	mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.68	--	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40	--	175[2)]	℃

[2)] $T_{vj\ op}$ > 175℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

NTC Characteristics (Tc = 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	Tc=100 ℃,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

Figure 1.Typical Output Characteristics

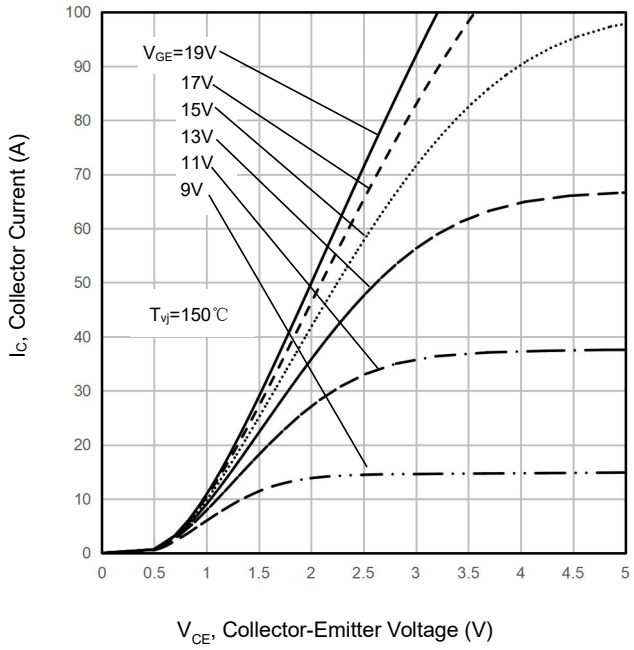


Figure 2.Typical Transfer Characteristics

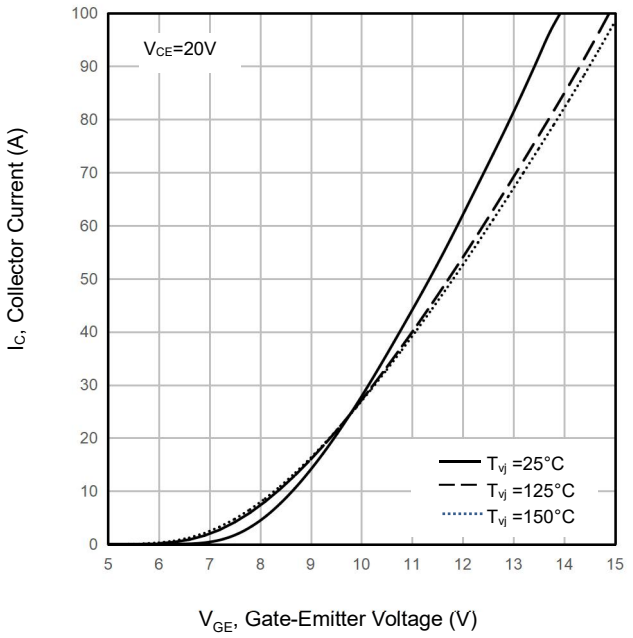


Figure 3.Switching Loss vs. Collector Current

V_{CE}=600V,V_{GE}=±15V,R_G=10Ω

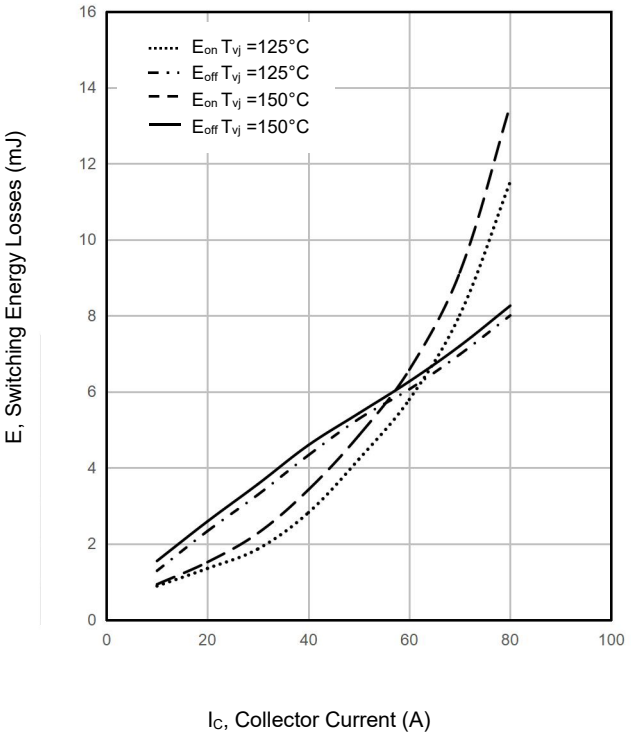


Figure 4.Switching Loss vs. R_G

V_{CE}=600V,V_{GE}=±15V,I_C=50A

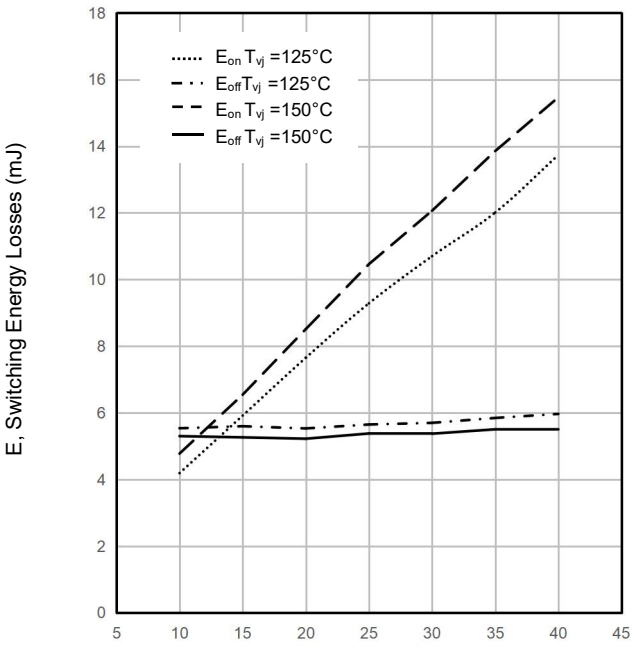


Figure 5.Switching Time IGBT

V_{CE}=600V,V_{GE}=±15V,R_G=10Ω,T_{vj}= 150℃

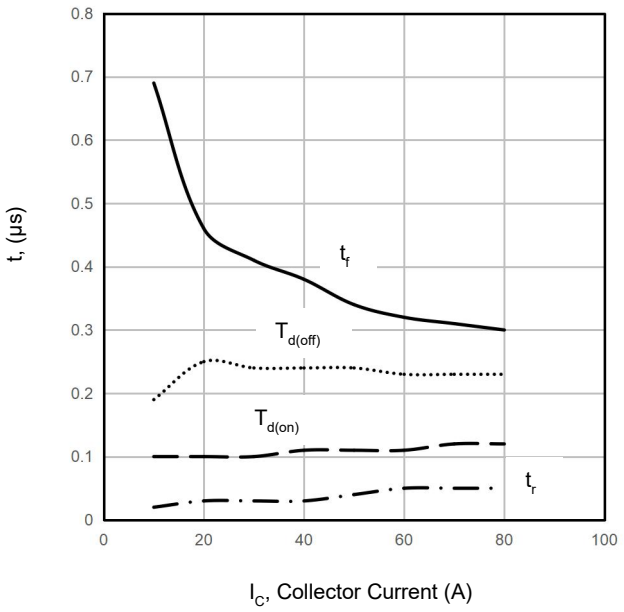


Figure 6.Capacitance IGBT

f=100KHz,V_{GE}=0V

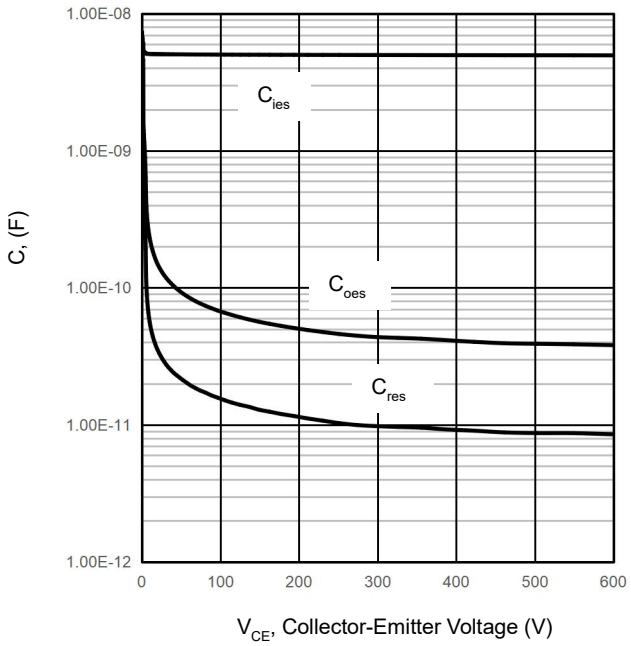


Figure 7.Gate Voltage

V_{CE}=600V,V_{GE}=15V,I_C=50A

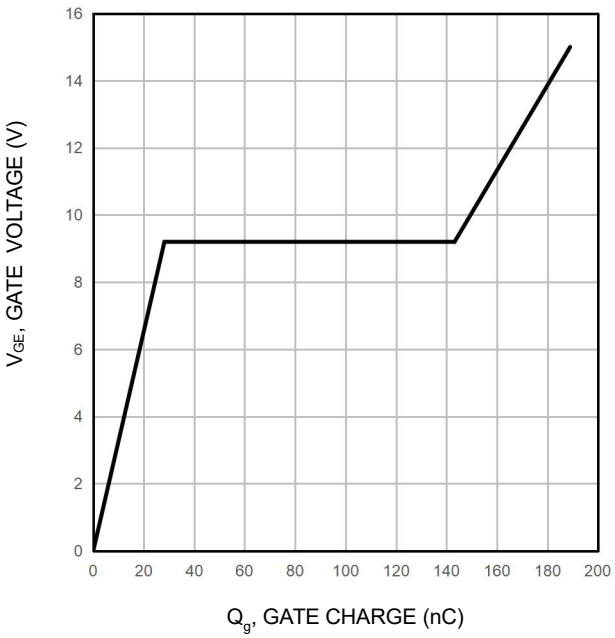


Figure 8.IGBT Transient Thermal Impedance

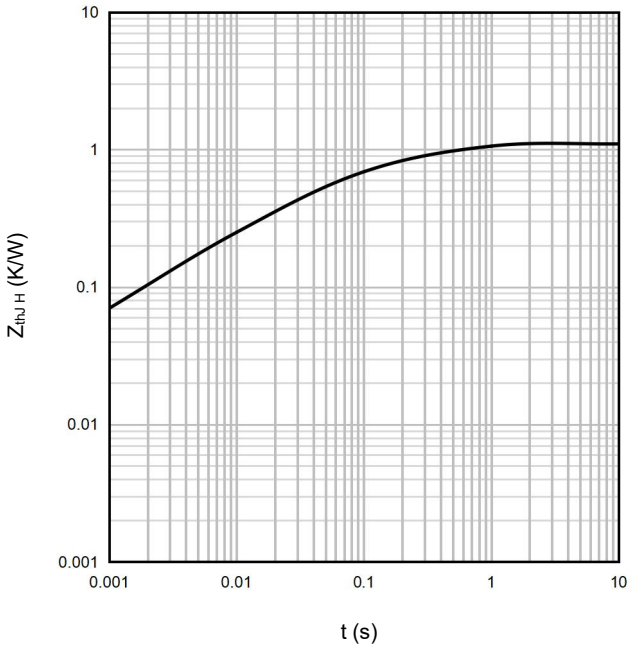


Figure 9.RBSOA IGBT

V_{GE}=±15V,R_G=10Ω,T_{vj}= 150℃

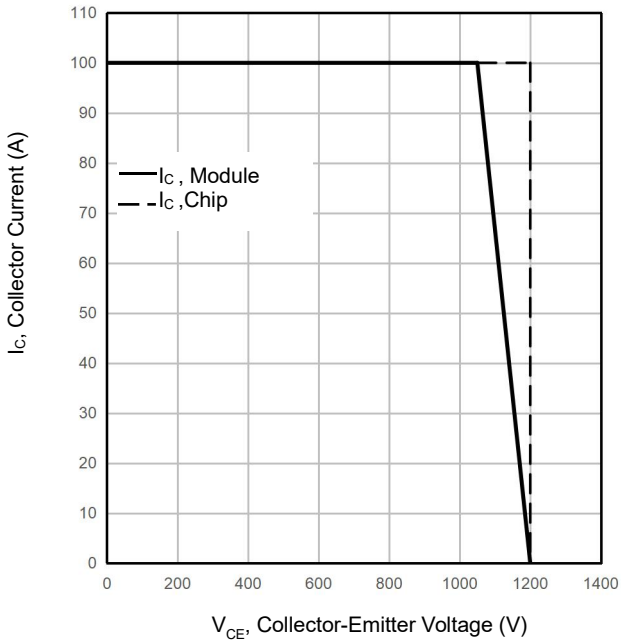


Figure 10.FBSOA IGBT

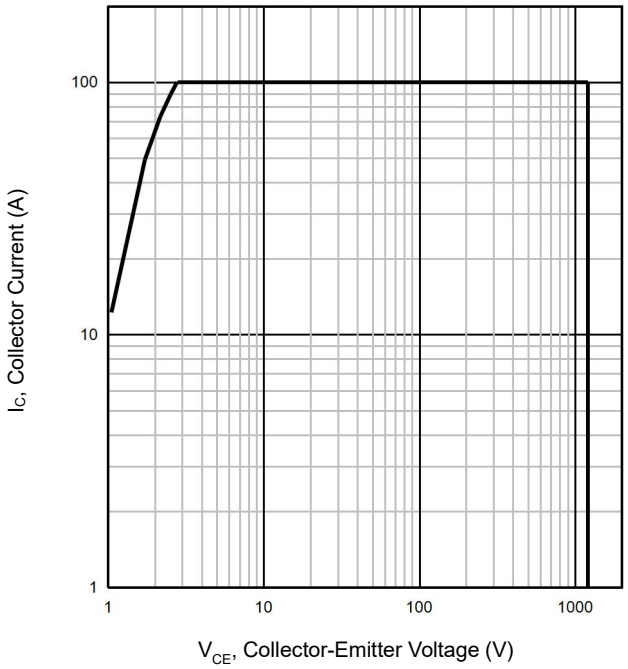


Figure 11.SCSOA IGBT

V_{GE}=±15V,R_G=15Ω,t_P≤10μs,T_{vj}= 150℃

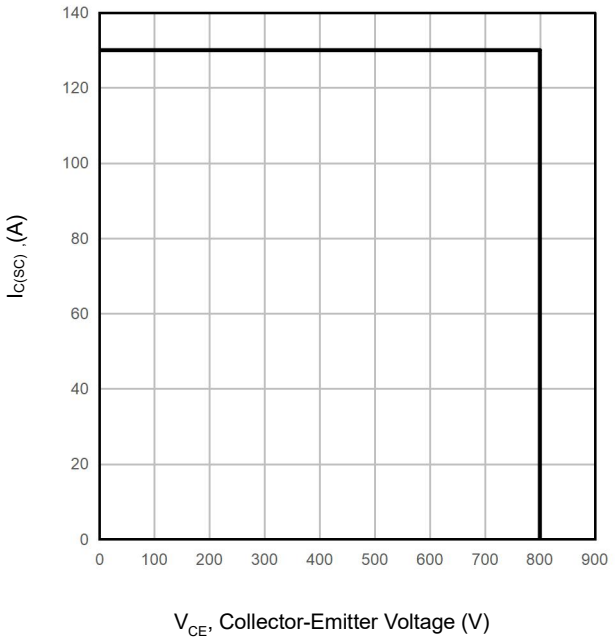


Figure 12.Reverse Recovery Energy Loss vs. IC

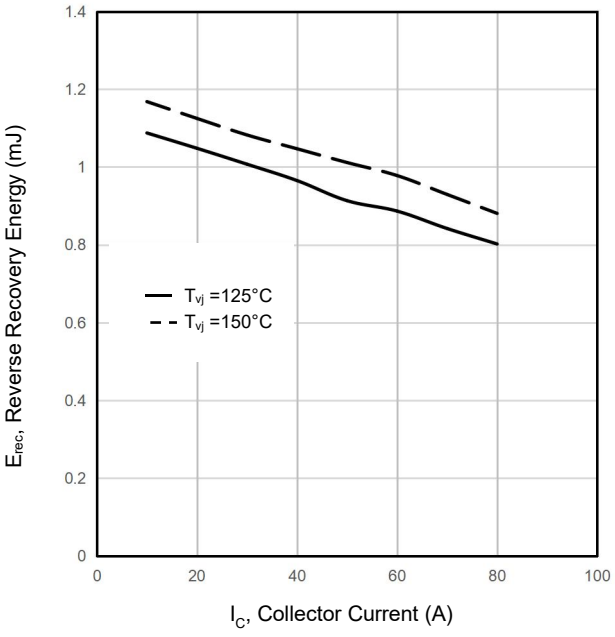


Figure 13.Reverse Recovery Energy Loss vs. R_G

V_{CE}=600V,R_G=10Ω

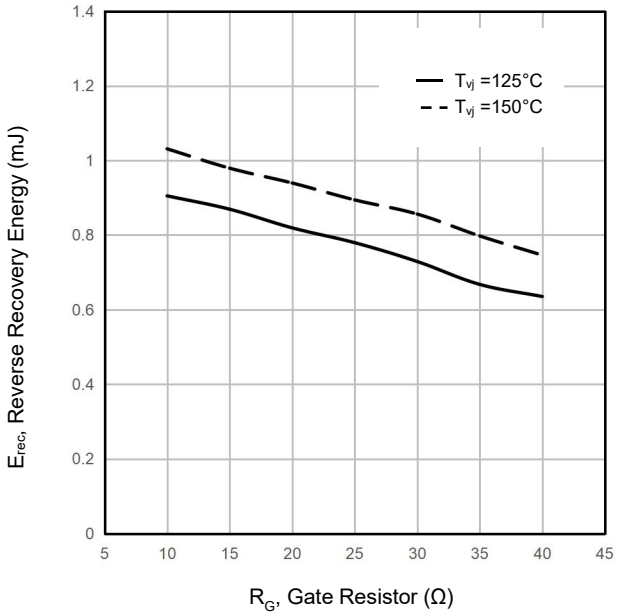


Figure 14.Diode Forward Characteristics

f=100KHz,V_{GE}=0V,T_{vj}= 25℃

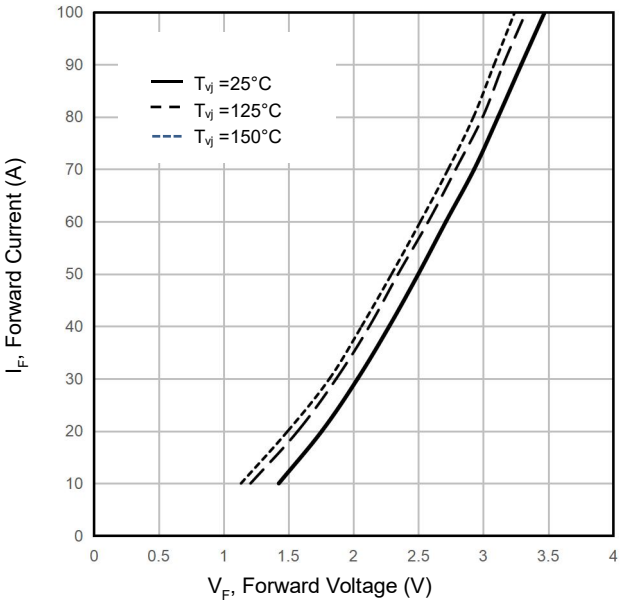


Figure 15.Diode Transient Thermal Impedance

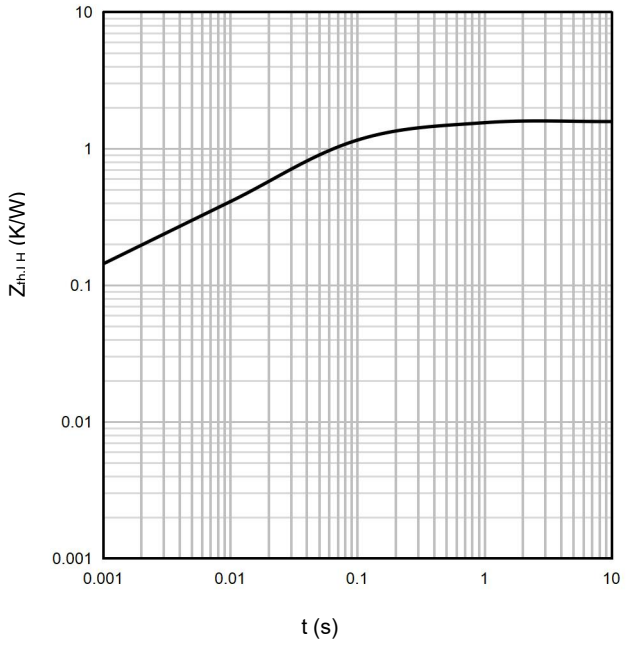
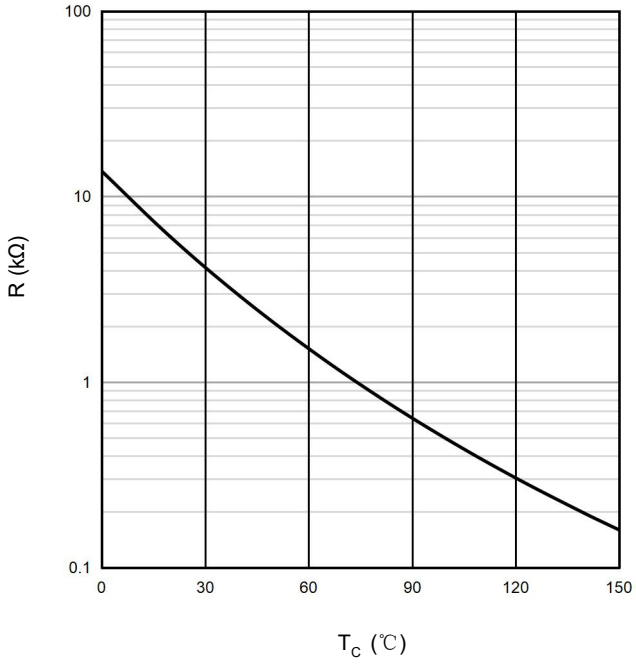
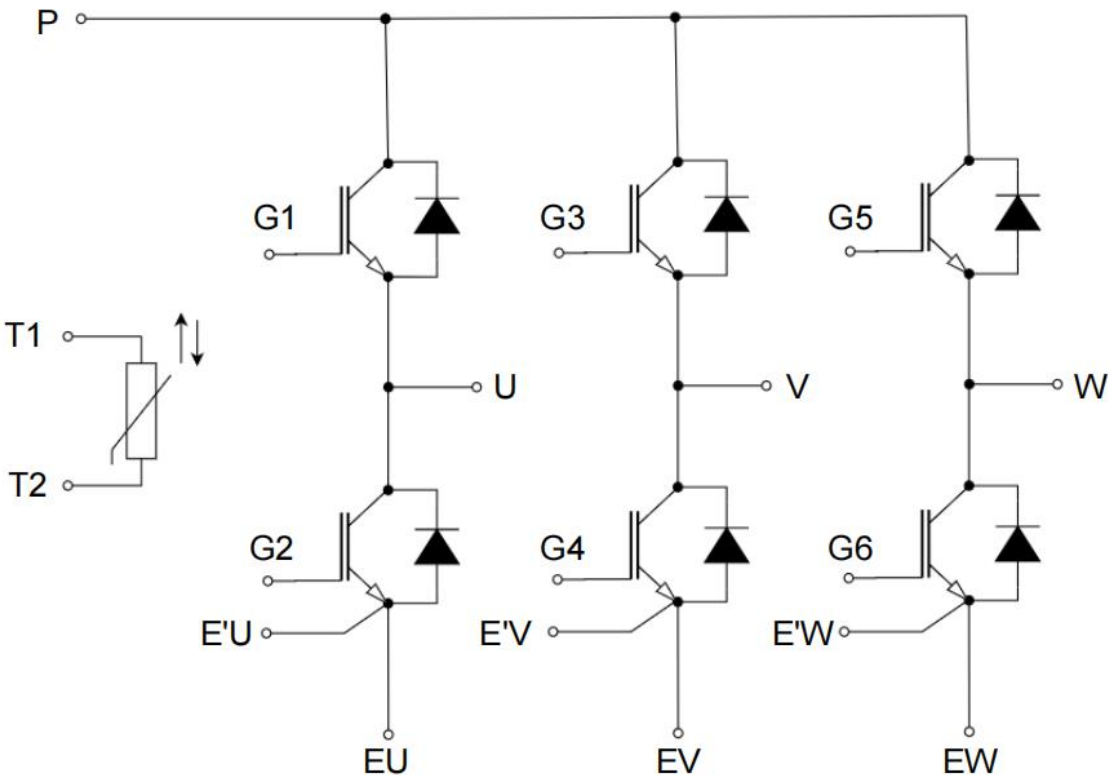


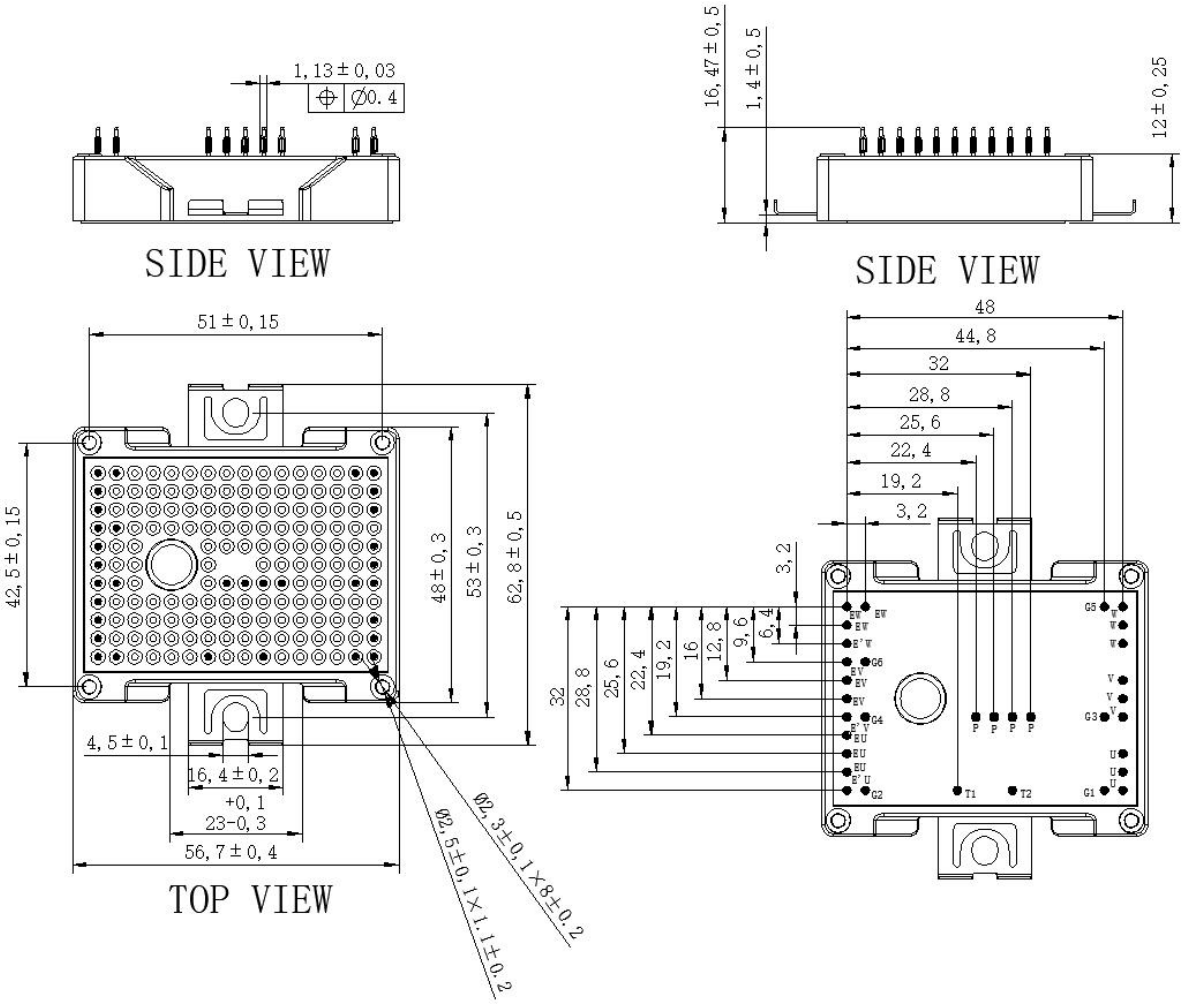
Figure 16.NTC Temperature Characteristic



CIRCUIT DIAGRAM



PACKAGE DIMENSION



REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2024-08-20	Preview
Rev.01	2025-1-21	PIN location degree modification

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