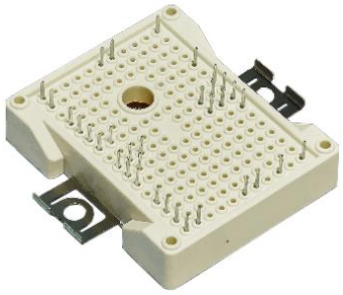
3-Level IGBT Module

DESCRIPTION：
- 650V Trench / Field Stop Technology
- Low Switching Power Loss
- Positive Temperature Coefficient

APPLICATIONS：
- 3 Level Application
- Photovoltaic Application
- UPS



V_{CES} =650V， $I_{C\ nom}$ =100A / I_{CRM} =200A

IGBT, Inverter

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Collector- Emitter Voltage	Tvj=25℃	V_{CES}	650	V
Continuous DC collector current	Tc=100℃, Tvj max=175℃	$I_{C\ nom}$	100	A
Repetitive peak collector current	t_P=1ms	I_{CRM}	200	A
Gate emitter voltage		V_{GE}	±20	V

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-Emitter saturation voltage VGE=15V, IC=100A Tvj=25℃ VGE=15V, IC=100A Tvj=125℃ VGE=15V, IC=100A Tvj=150℃	$V_{CE(SAT)}$		1.58 1.83 1.87	2.0	V
Gate-Emitter threshold voltage IC=1.6mA, VGE= VCE Tvj=25℃	$V_{GE(th)}$	4.6	5.2	5.8	V
Gate charge VGE = -15 V ... +15 V	Q_G		1.57		uC
Internal gate resistor (Tvj = 25°C)	R_{Gint}		None		Ω
Input capacitance f=1 MHz, VCE=25V, VGE=0V Tvj=25℃	C_{ies}		11.12		nF
Reverse transfer capacitance f=1 MHz, VCE=25V, VGE=0V Tvj=25℃	C_{res}		0.19		nF

Collector-emitter cut-off current VCE=650V, VGE=0V Tvj=25℃	I_{CES}			1	mA
Gate-emitter leakage current VCE=0V, VGE=20V Tvj=25℃	I_{GES}			100	nA
Turn-on delay time IC=100A, VCE=300 V Tvj=25℃ VGE=±15 V, RG=5Ω Tvj=125℃ (inductive load) Tvj=150℃	$td_{(ON)}$		17 16 15		ns
Rise time IC=100A, VCE=300 V Tvj=25℃ VGE=±15 V, RG=5Ω Tvj=125℃ (inductive load) Tvj=150℃	tr		22 25 25		ns
Turn-off delay time IC=100A, VCE=300 V Tvj=25℃ VGE=±15 V, RG=5Ω Tvj=125℃ (inductive load) Tvj=150℃	$td_{(OFF)}$		157 172 177		ns
Fall time IC=100A, VCE=300 V Tvj=25℃ VGE=±15 V, RG=5Ω Tvj=125℃ (inductive load) Tvj=150℃	tf		57 61 67		ns
Turn-on energy loss per pulse IC=100A, VCE=300 V Tvj=25℃ VGE=±15 V, RG=5Ω Tvj=125℃ (inductive load) Tvj=150℃	$E_{(ON)}$		0.42 0.60 0.66		mJ
Turn-off energy loss per pulse IC=100A, VCE=300 V Tvj=25℃ VGE=±15 V, RG=5Ω Tvj=125℃ (inductive load) Tvj=150℃	$E_{(OFF)}$		0.82 1.07 1.17		mJ
Temperature under switching conditions	Tvj op	-40		150	℃

Diode, Inverter

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Repetitive peak reverse voltage	Tvj=25℃	V_{RRM}	650	V
Continuous DC collector current		I_F	100	A
Repetitive peak collector current	t_P=1ms	I_{FRM}	200	A

I²t -value	VR=0 V, t_P=10ms, Tvj=125°C	I^2t	1200	A^2s

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage IF=100A, VGE=0 V Tvj=25℃ IF=100A, VGE=0 V Tvj=125℃ IF=100A, VGE=0 V Tvj=150℃	V_F		1.43 1.48 1.44	1.9	V
Peak reverse recovery current IF=100 A, Tvj=25℃ -diF/dt =3264A/μs(Tvj=150°C) Tvj=125℃ VR=300 V ,VGE= -15 V Tvj=150℃	I_{RM}		70 83 90		A
Recovered charge IF=100 A, Tvj=25℃ -diF/dt =3264A/μs(Tvj=150°C) Tvj=125℃ VR=300 V ,VGE= -15 V Tvj=150℃	Q_r		2.33 4.12 4.95		uC
Reverse recovered energy IF=100 A, Tvj=25℃ -diF/dt =3264A/μs(Tvj=150°C) Tvj=125℃ VR=300 V ,VGE= -15 V Tvj=150℃	E_{rec}		0.43 0.82 0.99		mJ
Temperature under switching conditions	Tvj op	-40		150	℃

Diode, D5-D6

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Repetitive peak reverse voltage	Tvj=25℃	V_{RRM}	650	V
Continuous DC collector current		I_F	100	A
Repetitive peak collector current	t_P=1ms	I_{FRM}	200	A
I²t -value	t_P=10ms, sin180^0, Tvj=125°C	I^2t	1200	A^2s

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage IF=100A, VGE=0 V Tvj=25℃ IF=100A, VGE=0 V Tvj=125℃ IF=100A, VGE=0 V Tvj=150℃	V_F		1.47 1.53 1.51	2.0	V

Reverse current IF=100 A, Tvj=25℃ -diF/dt =3699A/μs(Tvj=150°C) Tvj=125℃ VR=300 V ,VGE= -15 V Tvj=150℃	I_{RM}		74 93 102		A
Recovered charge IF=100 A, Tvj=25℃ -diF/dt =3699A/μs(Tvj=150°C) Tvj=125℃ VR=300 V ,VGE= -15 V Tvj=150℃	Q_r		2.31 4.13 5.30		uC
Reverse recovery energy IF=100 A, Tvj=25℃ -diF/dt =3699A/μs(Tvj=150°C) Tvj=125℃ VR=300 V ,VGE= -15 V Tvj=150℃	E_{rec}		0.46 0.91 1.20		mJ
Temperature under switching conditions	Tvj op	-40		150	℃

Negative temperature coefficient Thermistor (NTC-Thermistor)

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Rated resistances Tc=25℃, ±5%	R_{25}		5		kΩ
B-value ±1%	$B_{25/50}$		3380		K

Module

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Isolation test voltage RMS, f=50Hz, t=60s	V_{ISOL}		2500		V
Internal isolation			AL_2O_3		
Storage temperature	T_{STG}	-40		125	℃
Mounting torque for modul mounting	M	3		6	Nm
Weight	W		42		g

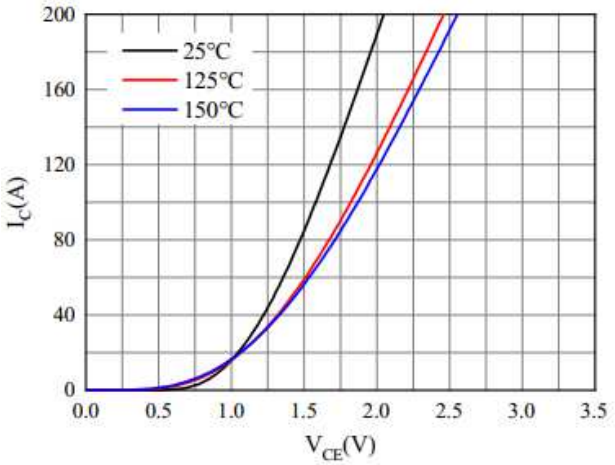


Figure 1. Typical output characteristics (VGE=15V)

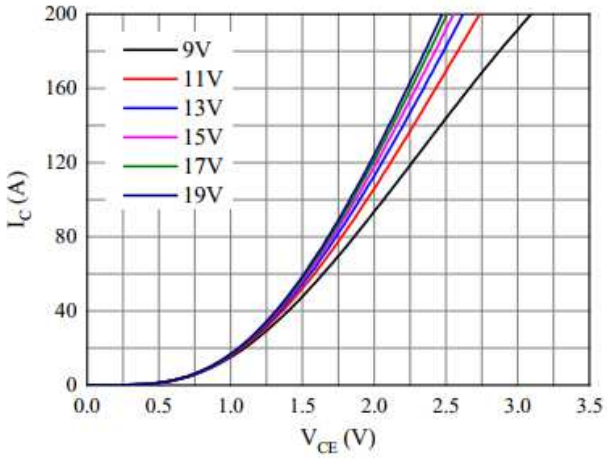


Figure 2. Typical output characteristics (Tvj=150℃)

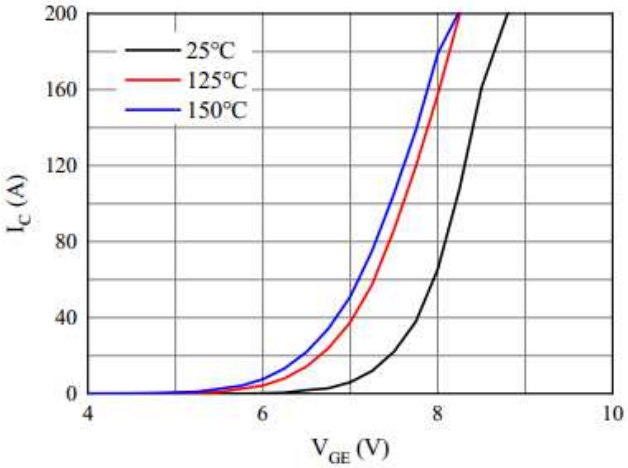


Figure 3. Typical transfer characteristic(VCE=20V)

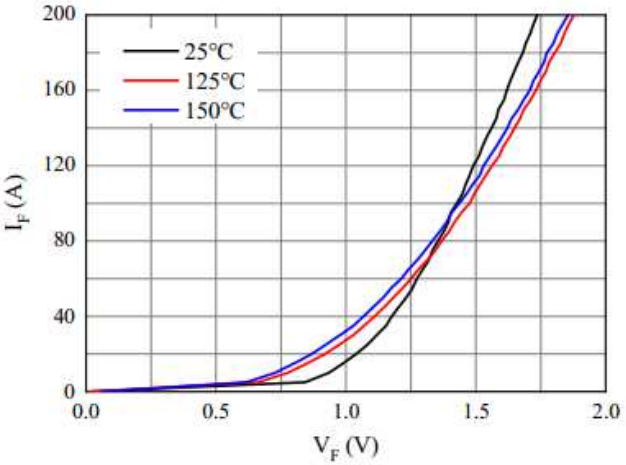


Figure 4. Forward characteristic of Diode

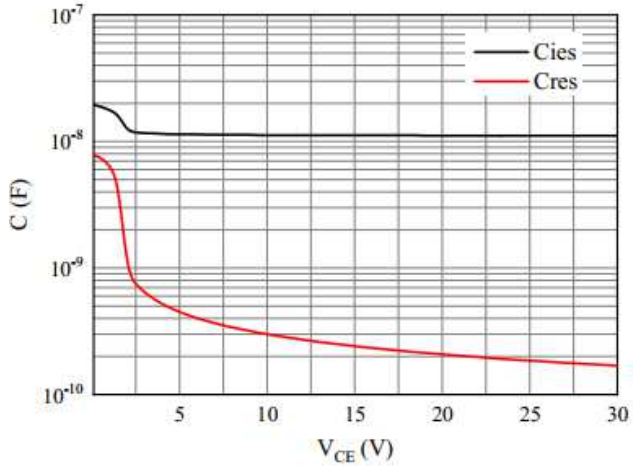


Figure 5. Capacitance characteristic

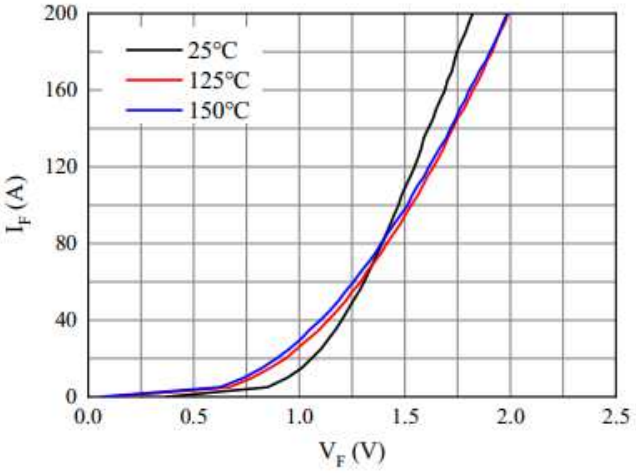


Figure 6. Forward characteristic of Diode,D5-D6

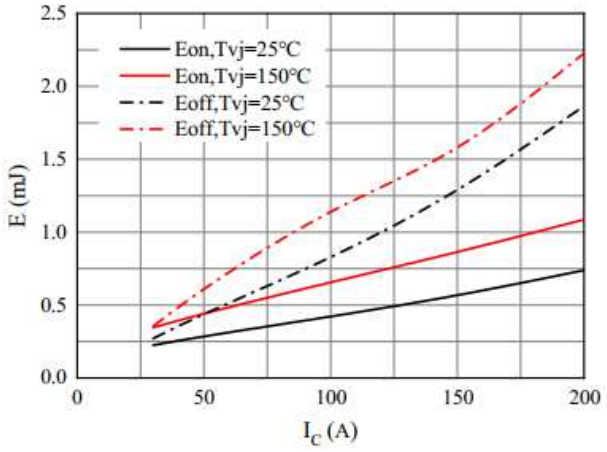


Figure 7. Switching losses of IGBT
VGE=±15V, RGon=5Ω, RGoff=5Ω, VCE=300V

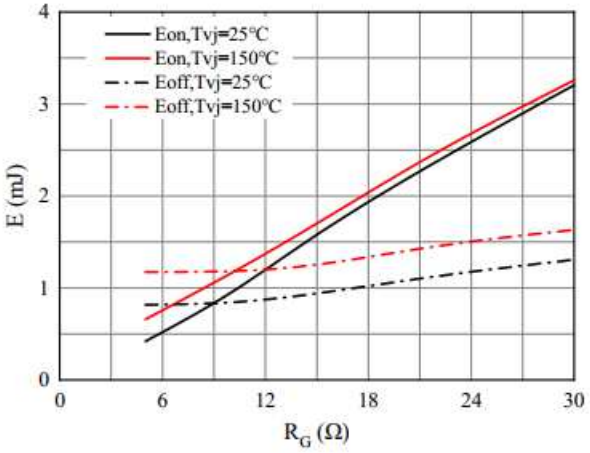


Figure 8. Switching losses of IGBT
VGE=±15V, IC=100A, VCE=300V

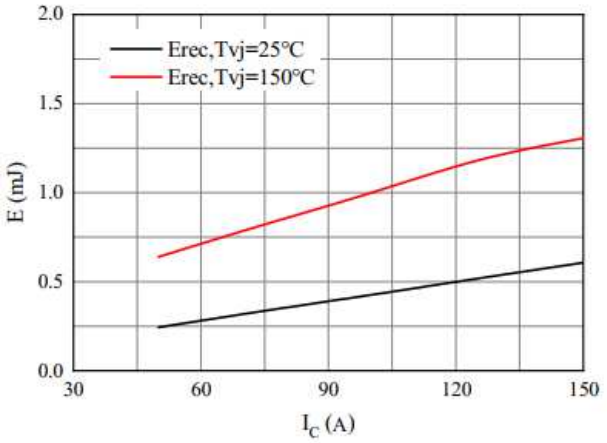


Figure 9. Switching losses of Diode
RGon=5Ω, VCE=300V

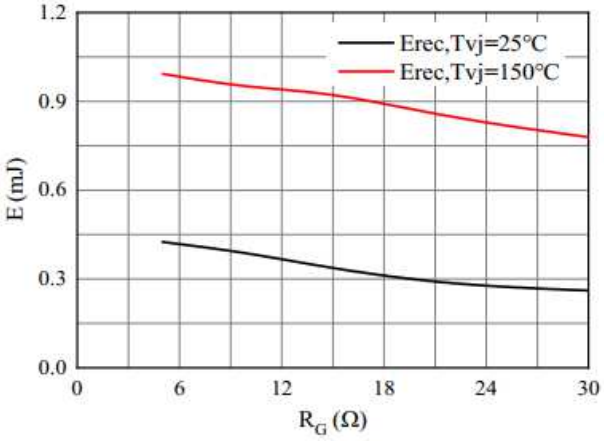


Figure 10. Switching losses of Diode
IF=100A, VCE=300V

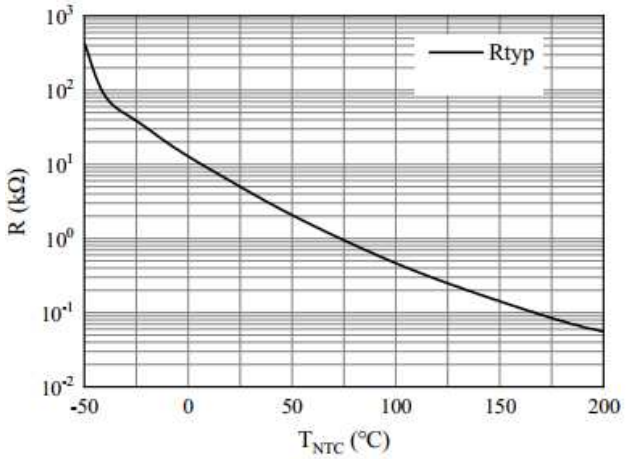
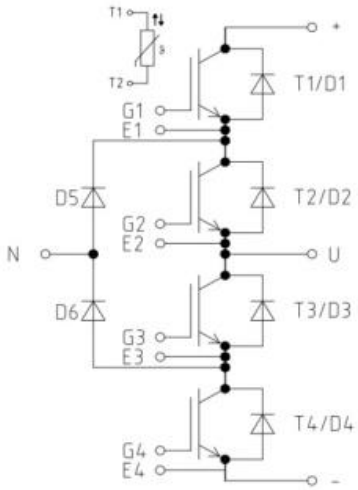
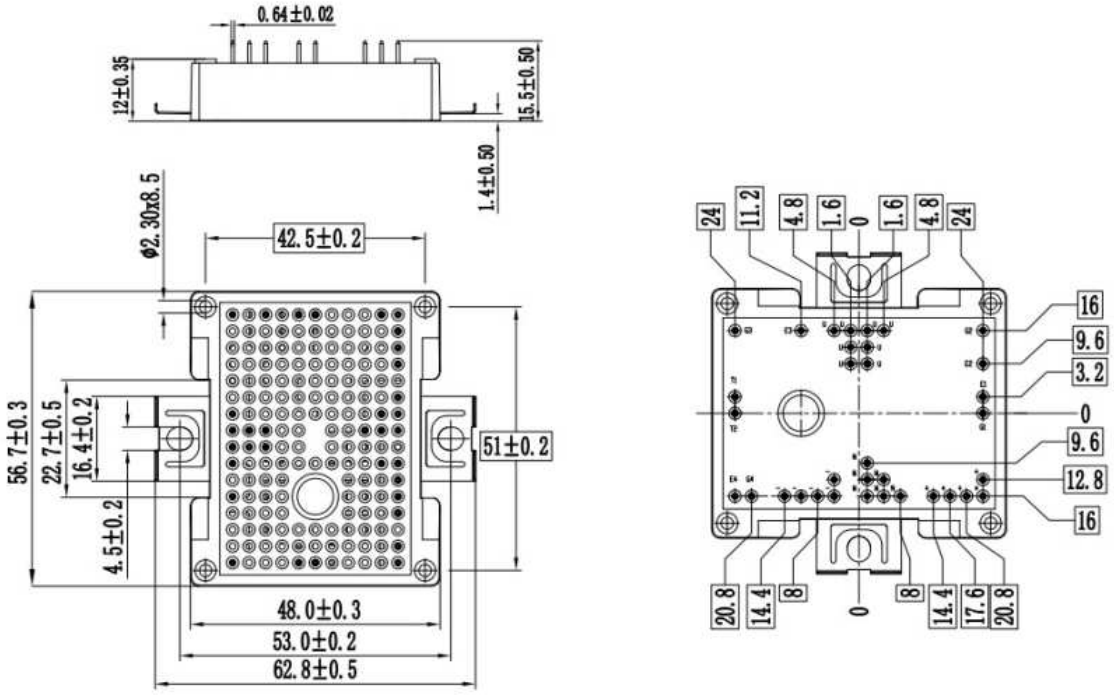


Figure 11. NTC-Themistor temperature characteristic

・Circuit diagram



・Package outlines : Dimensions in (mm)



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