

3-Level IGBT Module

DESCRIPTION :

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

APPLICATIONS :

- 3 Level Application
- Photovoltaic Application
- UPS



$V_{CES}=650V$, $I_{C\ nom}=150A$ / $I_{CRM}=300A$

IGBT, Inverter

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Collector- Emitter Voltage	$T_{vj}=25^{\circ}C$	V_{CES}	650	V
Continuous DC collector current	$T_c=100^{\circ}C$, $T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	150	A
Repetitive peak collector current	$t_p=1ms$	I_{CRM}	300	A
Gate emitter voltage		V_{GE}	± 20	V

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-Emitter saturation voltage $V_{GE}=15V$, $I_C=150A$ $T_{vj}=25^{\circ}C$ $V_{GE}=15V$, $I_C=150A$ $T_{vj}=125^{\circ}C$ $V_{GE}=15V$, $I_C=150A$ $T_{vj}=150^{\circ}C$	$V_{CE(SAT)}$		1.57 1.82 1.86	1.95	V
Gate-Emitter threshold voltage $I_C=2.4mA$, $V_{GE}=V_{CE}$ $T_{vj}=25^{\circ}C$	$V_{GE(th)}$	4.7	5.3	5.9	V
Gate charge $V_{GE} = -15V \dots +15V$	Q_G		1.54		μC
Internal gate resistor ($T_{vj} = 25^{\circ}C$)	R_{Gint}		None		Ω
Input capacitance $f=1\ MHz$, $V_{CE}=25V$, $V_{GE}=0V$ $T_{vj}=25^{\circ}C$	C_{ies}		16.47		nF
Reverse transfer capacitance $f=1\ MHz$, $V_{CE}=25V$, $V_{GE}=0V$ $T_{vj}=25^{\circ}C$	C_{res}		0.27		nF

M150R07G63L

Collector-emitter cut-off current VCE=650V, VGE=0V Tvj=25°C	ICES			1	mA
Gate-emitter leakage current VCE=0V, VGE=20V Tvj=25°C	IGES			400	nA
Turn-on delay time IC=150A, VCE=300 V Tvj=25°C VGE=±15 V, RG=3.3Ω Tvj=125°C (inductive load) Tvj=150°C	td (ON)		12 12 14		ns
Rise time IC=150A, VCE=300 V Tvj=25°C VGE=±15 V, RG=3.3Ω Tvj=125°C (inductive load) Tvj=150°C	tr		28 29 31		ns
Turn-off delay time IC=150A, VCE=300 V Tvj=25°C VGE=±15 V, RG=3.3Ω Tvj=125°C (inductive load) Tvj=150°C	td (OFF)		167 180 182		ns
Fall time IC=150A, VCE=300 V Tvj=25°C VGE=±15 V, RG=3.3Ω Tvj=125°C (inductive load) Tvj=150°C	tf		54 59 63		ns
Turn-on energy loss per pulse IC=150A, VCE=300 V Tvj=25°C VGE=±15 V, RG=3.3Ω Tvj=125°C (inductive load) Tvj=150°C	E(ON)		0.66 0.83 0.91		mJ
Turn-off energy loss per pulse IC=150A, VCE=300 V Tvj=25°C VGE=±15 V, RG=3.3Ω Tvj=125°C (inductive load) Tvj=150°C	E(OFF)		1.28 1.66 1.80		mJ
Temperature under switching conditions	Tvj op	-40		150	°C

Diode, Inverter

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Repetitive peak reverse voltage	Tvj=25°C	VRRM	650	V
Continuous DC collector current		IF	150	A
Repetitive peak collector current	tp=1ms	IFRM	300	A

I^2t -value	$V_R=0\text{ V}$, $t_p=10\text{ms}$, $T_{vj}=125^\circ\text{C}$	I^2t	1200	A^2s
---------------	---	--------	------	----------------------

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage $I_F=150\text{A}$, $V_{GE}=0\text{ V}$ $T_{vj}=25^\circ\text{C}$ $I_F=150\text{A}$, $V_{GE}=0\text{ V}$ $T_{vj}=125^\circ\text{C}$ $I_F=150\text{A}$, $V_{GE}=0\text{ V}$ $T_{vj}=150^\circ\text{C}$	V_F		1.62 1.71 1.69	2.0	V
Peak reverse recovery current $I_F=150\text{ A}$, $T_{vj}=25^\circ\text{C}$ $-diF/dt=4281\text{A}/\mu\text{s}$ ($T_{vj}=150^\circ\text{C}$) $T_{vj}=125^\circ\text{C}$ $V_R=300\text{ V}$, $V_{GE}=-15\text{ V}$ $T_{vj}=150^\circ\text{C}$	I_{RM}		83 102 112		A
Recovered charge $I_F=150\text{ A}$, $T_{vj}=25^\circ\text{C}$ $-diF/dt=4281\text{A}/\mu\text{s}$ ($T_{vj}=150^\circ\text{C}$) $T_{vj}=125^\circ\text{C}$ $V_R=300\text{ V}$, $V_{GE}=-15\text{ V}$ $T_{vj}=150^\circ\text{C}$	Q_r		3.05 5.32 6.17		μC
Reverse recovered energy $I_F=150\text{ A}$, $T_{vj}=25^\circ\text{C}$ $-diF/dt=4281\text{A}/\mu\text{s}$ ($T_{vj}=150^\circ\text{C}$) $T_{vj}=125^\circ\text{C}$ $V_R=300\text{ V}$, $V_{GE}=-15\text{ V}$ $T_{vj}=150^\circ\text{C}$	E_{rec}		0.69 1.28 1.49		mJ
Temperature under switching conditions	$T_{vj\text{ op}}$	-40		150	$^\circ\text{C}$

Diode, D5-D6
MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Repetitive peak reverse voltage	$T_{vj}=25^\circ\text{C}$	V_{RRM}	650	V
Continuous DC collector current		I_F	150	A
Repetitive peak collector current	$t_p=1\text{ms}$	I_{FRM}	300	A
I^2t -value	$t_p=10\text{ms}$, $\sin 180^\circ$, $T_{vj}=125^\circ\text{C}$	I^2t	1200	A^2s

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage $I_F=150\text{A}$, $V_{GE}=0\text{ V}$ $T_{vj}=25^\circ\text{C}$ $I_F=150\text{A}$, $V_{GE}=0\text{ V}$ $T_{vj}=125^\circ\text{C}$ $I_F=150\text{A}$, $V_{GE}=0\text{ V}$ $T_{vj}=150^\circ\text{C}$	V_F		1.65 1.76 1.73	2.0	V

Reverse current IF=150 A, -diF/dt =4281A/μs(Tvj=150°C) VR=300 V ,VGE= -15 V	Tvj=25°C Tvj=125°C Tvj=150°C	I_{RM}		83 102 112		A
Recovered charge IF=150 A, -diF/dt =4281A/μs(Tvj=150°C) VR=300 V ,VGE= -15 V	Tvj=25°C Tvj=125°C Tvj=150°C	Q_r		3.05 5.32 6.17		uC
Reverse recovery energy IF=150 A, -diF/dt =4281A/μs(Tvj=150°C) VR=300 V ,VGE= -15 V	Tvj=25°C Tvj=125°C Tvj=150°C	E_{rec}		0.69 1.28 1.49		mJ
Temperature under switching conditions		Tvj op	-40		150	°C

Negative temperature coefficient Thermistor (NTC-Thermistor)

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Rated resistances Tc=25°C, ±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 ₂ O ₃			
Storage temperature	T_{STG}	-40		125	°C
Mounting torque for modul mounting	M	3		6	Nm
Weight	W		41		g

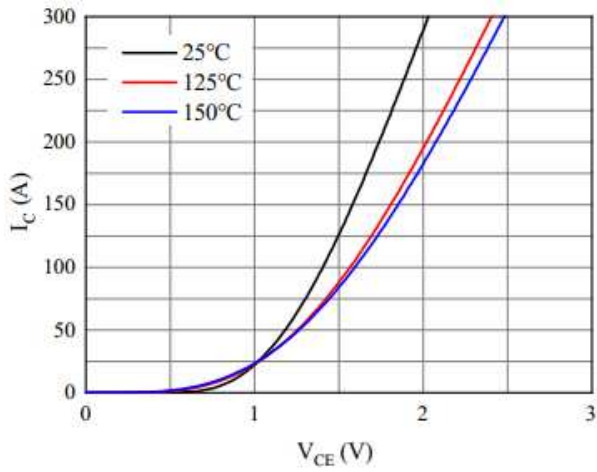


Figure 1. Typical output characteristics (VGE=15V)

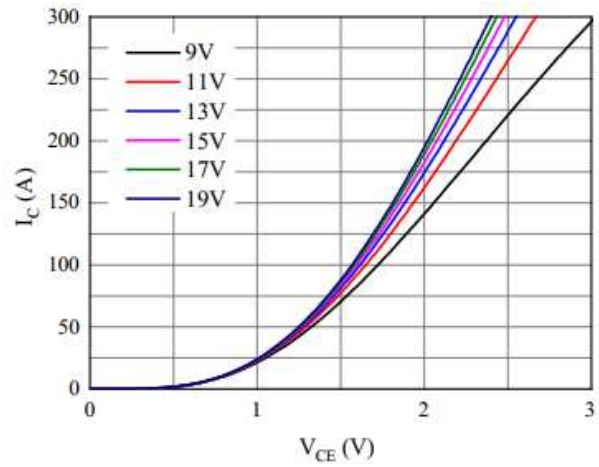


Figure 2. Typical output characteristics (Tvj=150°C)

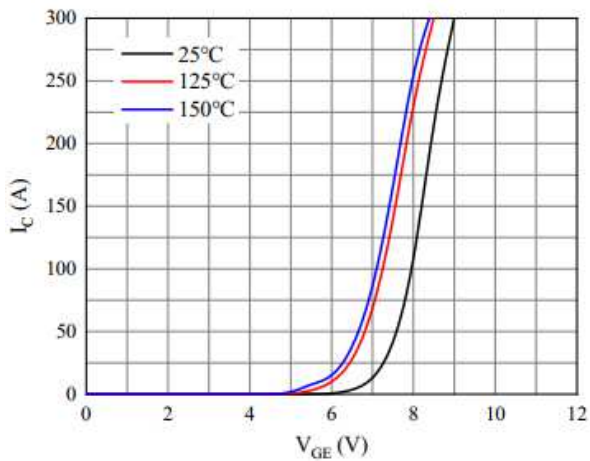


Figure 3. Typical transfer characteristic (VCE=20V)

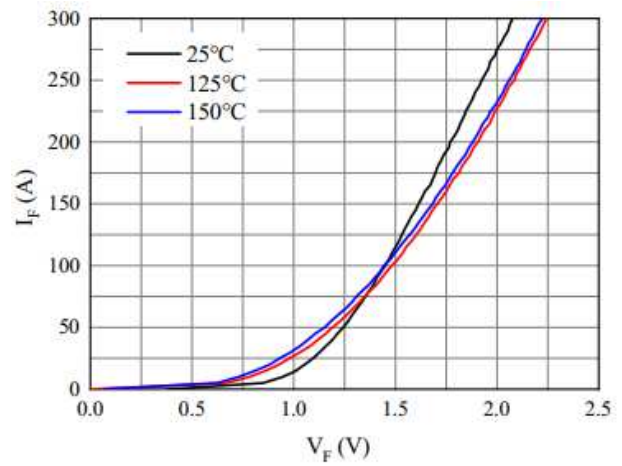


Figure 4. Forward characteristic of Diode

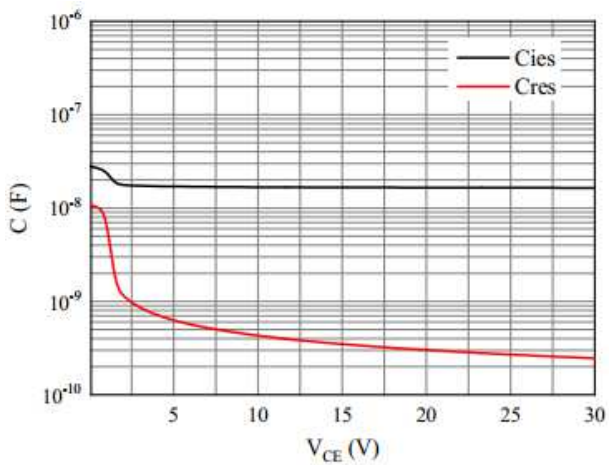


Figure 5. Capacitance characteristic

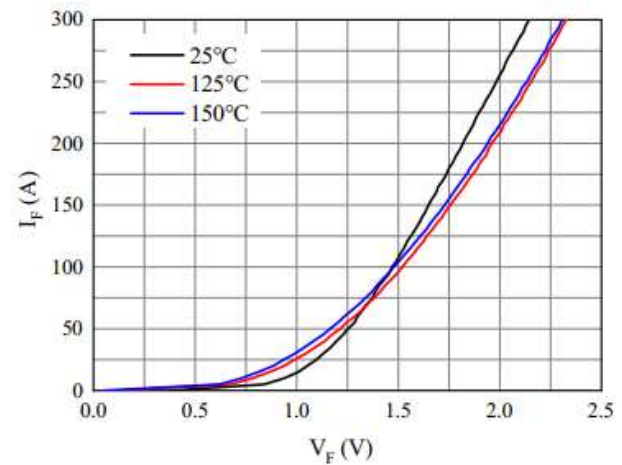


Figure 6. Forward characteristic of Diode, D5-D6

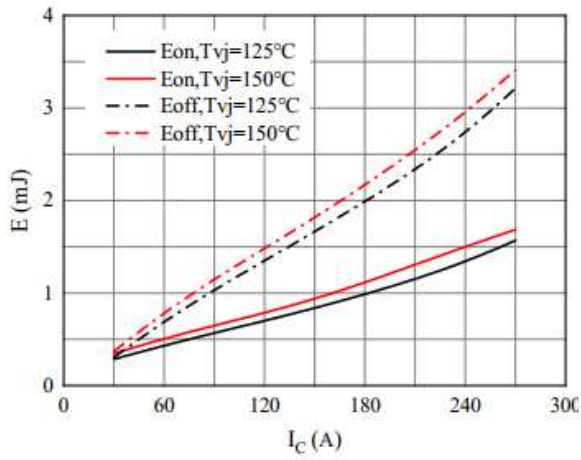


Figure 7. Switching losses of IGBT
VGE=±15V, RGon=3.3Ω, RGoff=3.3Ω, VCE=300V

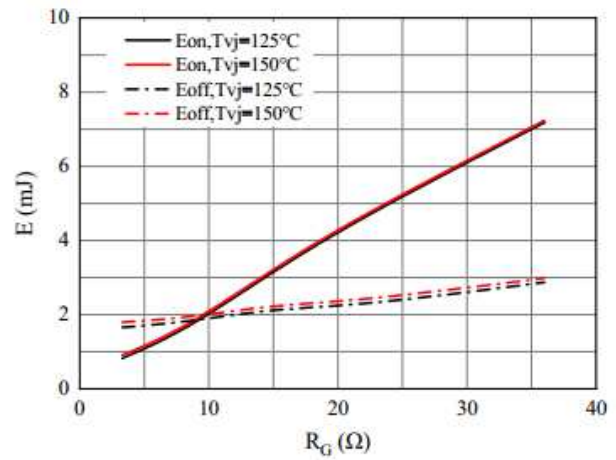


Figure 8. Switching losses of IGBT
VGE=±15V, IC=150A, VCE=300V

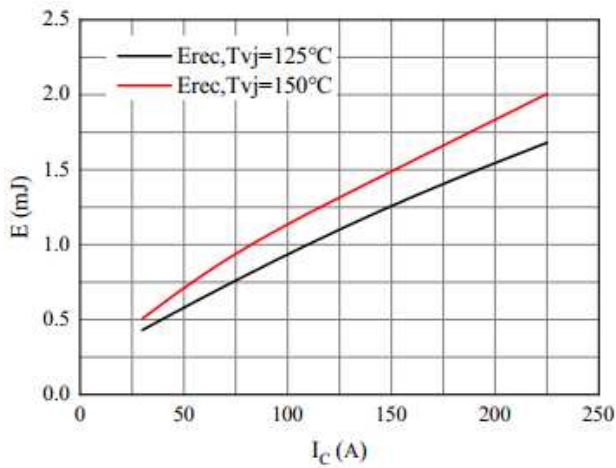


Figure 9. Switching losses of Diode
RGon=3.3Ω, VCE=300V

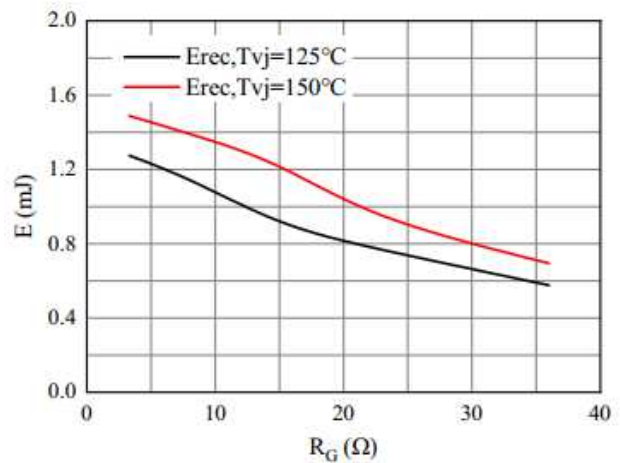


Figure 10. Switching losses of Diode
IF=150A, VCE=300V

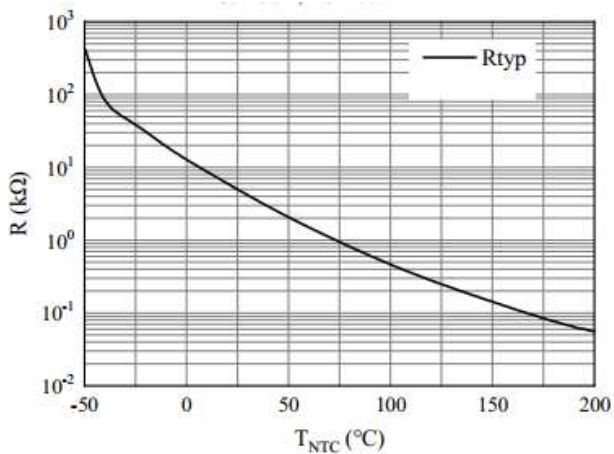
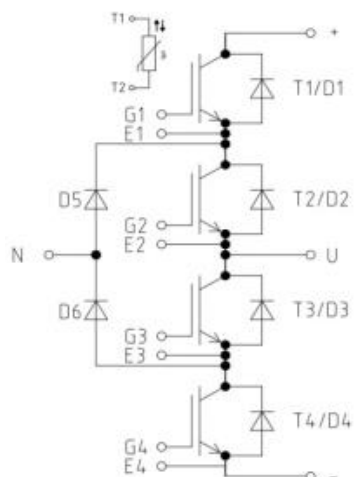
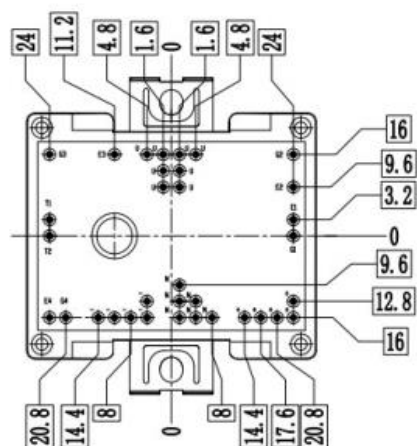
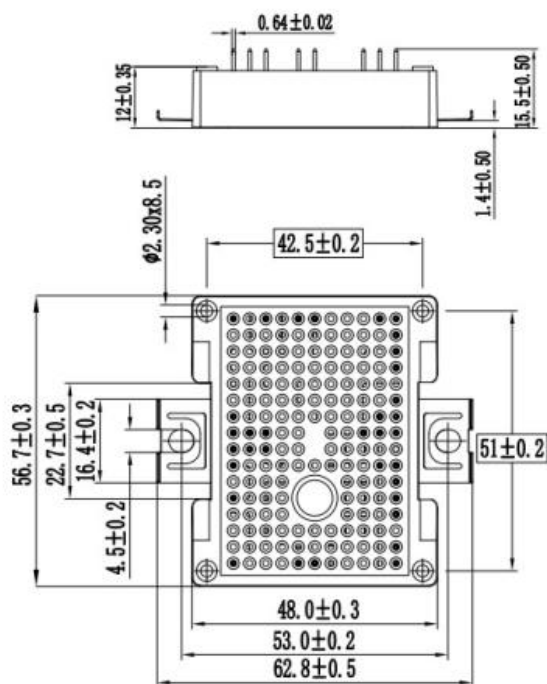


Figure 11. NTC-Themistor temperature characteristic

- Circuit diagram



- Package outlines : Dimensions in (mm)



Notice

MOSPEC reserves the rights to make changes of the content herein the document anytime without notification. MOSPEC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies. Please refer to MOSPEC website for the last document.

MOSPEC disclaims any and all liability arising out of the application or use of any product including damages incidentally and consequentially incurred.

Application shown on the herein document are examples of standard use and operation. Customers are responsible for comprehending suitable use in particular applications. MOSPEC makes no representation or warranty that such application will be suitable for the specified use without further testing or modification.

The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by MOSPEC for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of MOSPEC or others.

These MOSPEC products are intended for usage in general electronic equipment. Please make sure to consult with MOSPEC before you use these MOSPEC products in equipment which require specialized quality and/or reliability, and in equipment which could have major impact to the welfare of human life (atomic energy control, aeronautics , traffic control, combustion control, safety devices etc.)