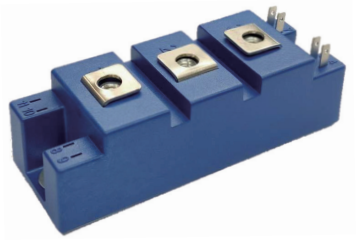
IGBT Power Module
600V/100A

Preliminary

HD-9434



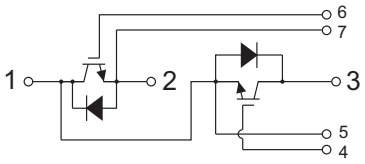
Features

- 34mm Fast Switching IGBT Trench Technology
- Low Switching Loss
- Super Fast Diodes
- High Short Circuit Capability

Applications

- Welder / Power Supply
- UPS / Inverter
- Industrial Motor Drive

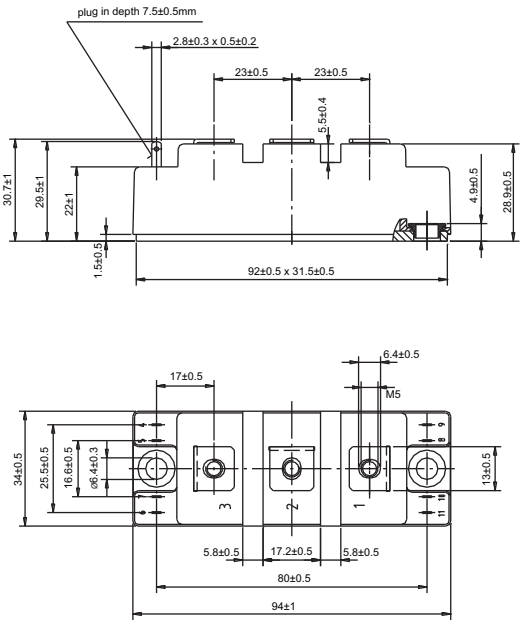
Circuit Diagram Headline



Maximum Ratings (T_C= 25℃)

Item		Symbol	Rated Value	Unit
Collector-Emitter Voltage		V_{CES}	600	V
Gate-Emitter Voltage		V_{GES}	±20	V
DC-Collector Current	T_C = 70℃	$I_{C,nom.}$	100	A
Repetitive Peak Collector Current	tp =1ms, T_C = 70℃	I_{CRM}	200	A
Total Power Dissipation		P_{tot}	445	W
Isolation Voltage	RMS, f=50Hz, t=1min	V_{iso}	3000	V
DC Forward Current		I_F	100	A
Repetitive Peak Forward Current	tp =1ms	I_{FRM}	200	A
Temperature under switching conditions		$T_{vj\ op}$	−40～+150	℃
Storage Temperature Range		T_{stg}	−40～+125	℃
Mounting Torque	Module Base to Heatsink		3～5	N.m
	Busbar to Terminal		2.5～5	

Package Outlines



Dimensions in mm (1 mm = 0.0394")

Preliminary Data

■ Electrical Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C =100A, V_{GE} =15V T_{vj}=25°C		1.95	2.45	V
		I_C =100A, V_{GE} =15V T_{vj}=125°C		2.2		
Gate threshold voltage	V_{GEth}	I_C =1.5mA, V_{CE} =V_{GE}, T_{vj} =25°C	4.5	5.5	6.5	V
Gate charge	Q_G	V_{GE}= -15 V... +15 V		0.6		µC
Internal gate resistor	R_{Gint}	T_{vj} =25°C		4.7		Ω
Input capacitance	C_{ies}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V		10.15		nF
Output capacitance	C_{oes}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V		0.65		nF
Reverse transfer capacitance	C_{res}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V		0.35		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} =600V, V_{GE} =0V, T_{vj} =25°C		1	500	µA
Gate-emitter leakage current	I_{GES}	V_{CE} =0V, V_{GE} =20V, T_{vj} =25°C			400	nA
Turn-on delay time, inductive load	$t_{d\ on}$	I_C =100A, V_{CE} =300V T_{vj}=25°C		135		ns
		V_{GE} = ±15V, R_{Gon} =3Ω T_{vj}=125°C		136		
Rise time, inductive load	t_r	I_C =100A, V_{CE} =300V T_{vj}=25°C		23		ns
		V_{GE} = ±15V, R_{Gon} =3Ω T_{vj}=125°C		24		
Turn-off delay time, inductive load	$t_{d\ off}$	I_C =100A, V_{CE} =300V T_{vj}=25°C		141		ns
		V_{GE} = ±15V, R_{Goff} =3Ω T_{vj}=125°C		161		
Fall time, inductive load	t_f	I_C =100A, V_{CE} =300V T_{vj}=25°C		33		ns
		V_{GE} = ±15V, R_{Goff} =3Ω T_{vj}=125°C		43		
Turn-on energy loss per pulse	E_{on}	I_C =100A, V_{CE} =300V, L_S =15nH T_{vj}=25°C		0.94		mJ
		V_{GE} = 15V, R_{Gon} =3Ω				
Turn-off energy loss per pulse	E_{off}	I_C =100A, V_{CE} =300V, L_S =15nH T_{vj}=25°C		2.9		mJ
		V_{GE} = 15V, R_{Gon} =3Ω				
SC data	I_{SC}	V_{GE} ≤15V, V_{CC} =360V t_P ≤10µs,		450		A
		V_{CEmax} =V_{CES} - L_{sCE} ·di/dt T_{vj} ≤ 125°C				
Thermal resistance, junction to case	R_{thJC}	per IGBT			0.28	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per IGBT		0.08		°C/W
External gate resistance	R_{Gext}	T_{vj} =25°C	2.2		20	Ω

■ Diode Ratings & Characteristics

Characteristics	Symbol	Test Conditions	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj} =25°C	600	V
Continuous DC forward current	I_F		100	A
Repetitive peak forward current	I_{FRM}	t_P =1ms	200	A
I²t - value	I²t	V_R =0V, t_P =10ms, T_{vj} =125°C	1250	A²s

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Forward voltage	V_F	I_F =100A, V_{GE} =0V	T_{vj} =25°C		1.8	2.5	V
		I_F =100A, V_{GE} =0V	T_{vj} =125°C		1.75		
Peak reverse recovery current	I_{RM}	I_F =100A, R_G =3Ω	T_{vj} =25°C		37		A
		V_R =300V, V_{GE} = -15V	T_{vj} =125°C		67		
Recovered charge	Qr	I_F =100A, R_G =3Ω	T_{vj} =25°C		1.74		µC
		V_R =300V, V_{GE} = -15V	T_{vj} =125°C		7.04		
Reverse recovery energy	Erec	I_F =100A, R_G =3Ω	T_{vj} =25°C		0.5		mJ
		V_R =300V, V_{GE} = -15V	T_{vj} =125°C		-		
Reverse Recovery Time	Trr	I_F =100A, R_G =3Ω, V_R =300V, V_{GE} = -15V, T_{vj}=25°C			145		ns
Thermal resistance, junction to case	R_{thJC}	per diode				0.5	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per diode			0.13		°C/W
Temperature under switching conditions	$T_{vj\ op}$			-40		150	°C

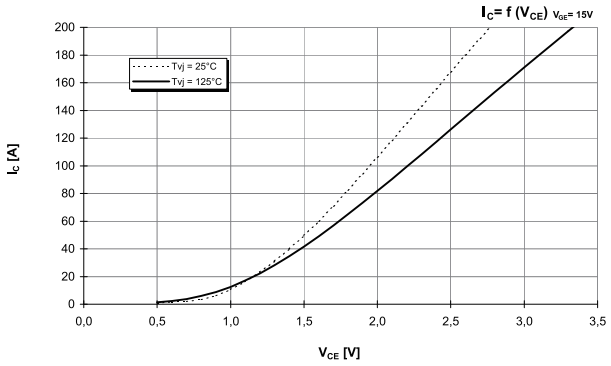
■ Module Ratings & Characteristics

Characteristics	Symbol	Test Conditions	Value	Unit
Material of module baseplate			Cu	
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance		terminal to heatsink	17	mm
		terminal to terminal	20	
Clearance		terminal to heatsink	17	mm
		terminal to terminal	9.5	
Comperative tracking index	CTI		>200	

Typical Characteristics

Preliminary Data

Fig.1 Output characteristic (Typical)



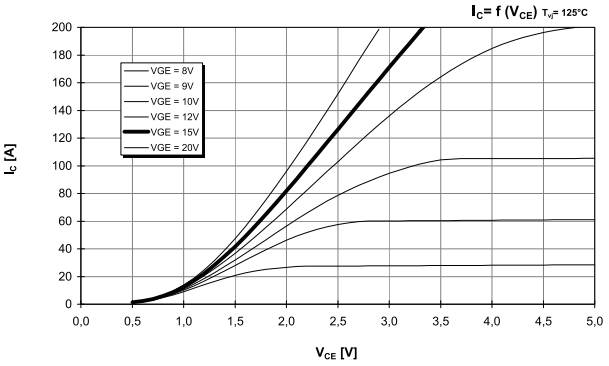


Fig.2 Transfer characteristic (Typical)

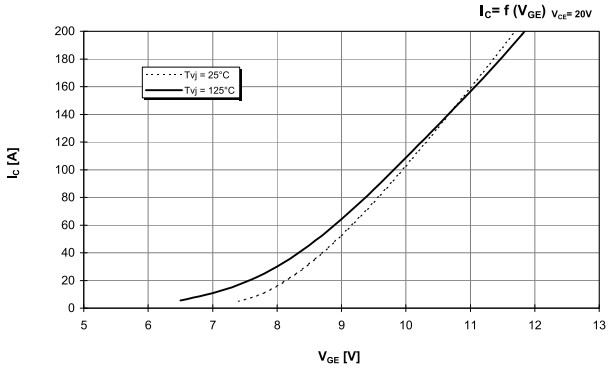


Fig.3 Forward characteristic of inverse diode (typical)

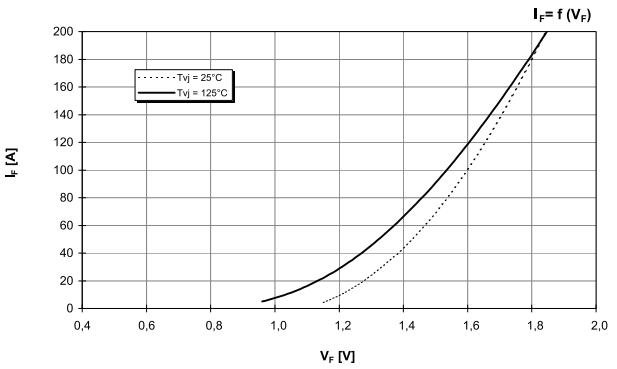
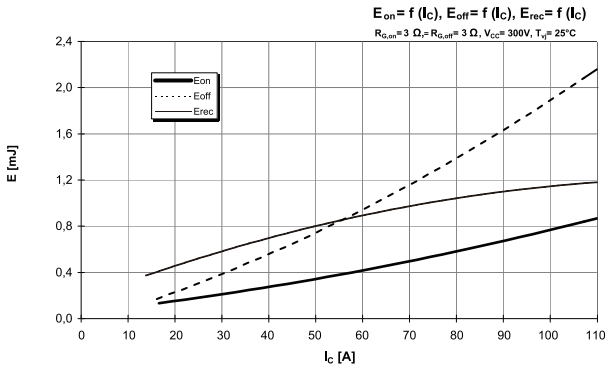


Fig.4 Switching losses (Typical)



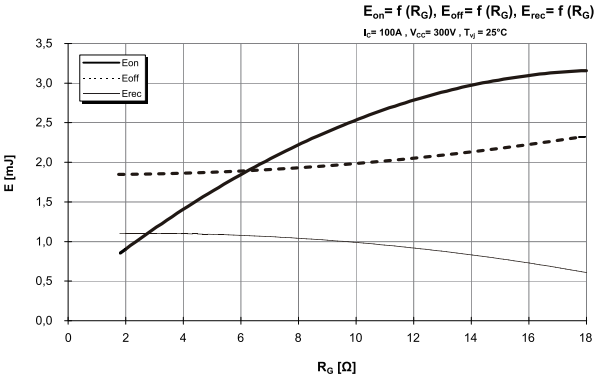


Fig.5 Transient thermal impedance

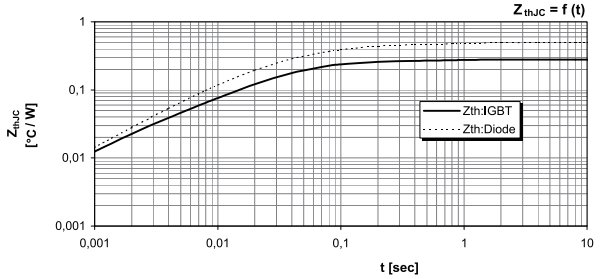
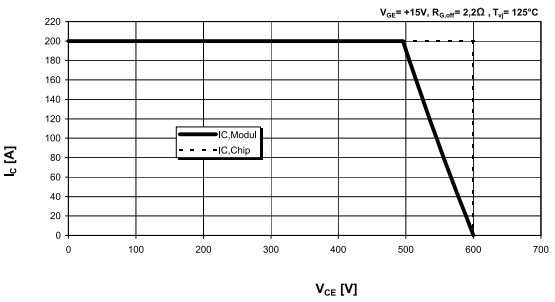


Fig.6 Reverse bias safe operation area (RBSOA)



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