

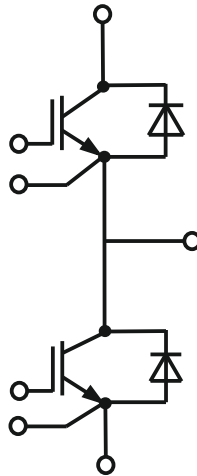
IGBT Module, 650V/150A

Features

- FS Trench technology
- Low switching losses
- $V_{CE(sat)}$ with positive Temperature coefficient
- Low saturation voltage, $V_{CE(sat)}$

Applications

- AC inverter drives
- Servo drives
- UPS systems
- Power supplies

**Absolute Maximum Ratings** ($T_C = 25^{\circ}\text{C}$ unless otherwise noted)

IGBT				
Parameter	Conditons	Symbol	Values	Units
Collector-to-Emitter Voltage		V_{CE}	650	V
Gate-to-Emitter Voltage		V_{GE}	± 25	V
DC Collector Current	$T_j = 25^{\circ}\text{C}$	I_C	240	A
	$T_j = 100^{\circ}\text{C}$		150	
Pulsed Collector Current		I_{CM}	480	A
Short circuit withstand time	$V_{GE} = 15\text{V}$, $V_{CC} = 600\text{V}$, $V_{CES} < 1000\text{V}$, $T_j = 150^{\circ}\text{C}$	T_{sc}	6	μs

Diode				
Parameter	Conditons	Symbol	Values	Units
Peak Repetitive Reverse Voltage		V_{RRM}	650	V
DC Blocking Voltage		V_R	650	V
Average Rectified Forward Current		$I_{F(AV)}$	150	A
Repetitive Peak Surge Current		I_{FRM}	300	A
Non-repetitive Peak Surge Current	$t_p = 8.3\text{ms}$	I_{FSM}	400	A

Module				
Parameter	Conditons	Symbol	Values	Units
Junction Temperature Range		T_{jmax}	$-45...+175$	$^{\circ}\text{C}$
Operating Junnction Temperature		T_{jop}	$-45...+150$	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-45...+150$	$^{\circ}\text{C}$
Isolation Voltage	$f = 50\text{Hz}$, $t = 1 \text{ min.}$	V_{iso}	4000	V

Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

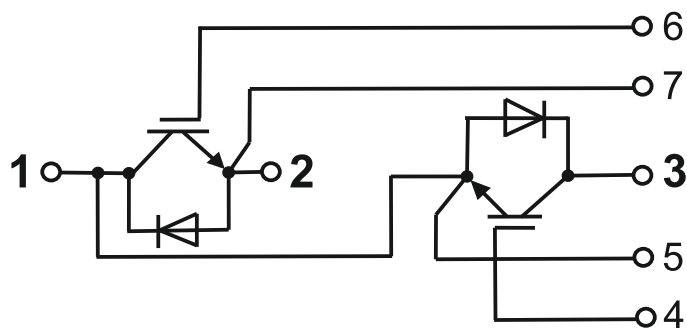
IGBT						
Parameter	Conditons	Symbol	Min.	Typ.	Max.	Units
Collector-to-Emitter Breakdown Voltage	$I_C = 250\mu\text{A}$, $V_{GE} = 0\text{V}$, $T_j = 25^\circ\text{C}$	$V_{(BR)CES}$	650	-	-	V
Collector-to-Emitter Leakage Current	$V_{CE} = 650\text{V}$, $V_{GE} = 0\text{V}$, $T_j = 25^\circ\text{C}$	I_{CES}	-	-	20	μA
	$V_{CE} = 650\text{V}$, $V_{GE} = 0\text{V}$, $T_j = 150^\circ\text{C}$		-	-	1.0	mA
Gate-to-Emitter Leakage Current	$V_{GE} = \pm 30\text{V}$, $V_{CE} = 0\text{V}$, $T_j = 25^\circ\text{C}$	I_{GES}	-	-	± 200	nA
	$V_{GE} = \pm 30\text{V}$, $V_{CE} = 0\text{V}$, $T_j = 150^\circ\text{C}$		-	-	± 400	
Gate Threshold Voltage	$V_{CE} = V_{GE}$, $I_C = 1\text{mA}$	$V_{GE(th)}$	4.0	5.5	7.0	V
Collector-emiter saturation voltage	$V_{GE} = 15\text{V}$, $I_C = 150\text{A}$, $T_j = 25^\circ\text{C}$	V_{CEsat}	-	1.80	2.3	V
	$V_{GE} = 15\text{V}$, $I_C = 10\text{A}$, $T_j = 150^\circ\text{C}$		-	2.2	-	
Input Capacitance	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_a = 25^\circ\text{C}$	C_{iss}	-	12244	-	pF
Output Capacitance		C_{oss}	-	464	-	
Reverse Transfer Capacitance		C_{rss}	-	128	-	
Turn-on delay tme	$V_{CE} = 400\text{V}$, $I_C = 150\text{A}$, $R_g = 5.5\Omega$, $V_{GE} = 15\text{V}$, $T_j = 25^\circ\text{C}$	$t_{d(on)}$	-	66	-	ns
Rise time		t_r	-	253	-	ns
Turn-off delay time		$t_{d(off)}$	-	214	-	ns
Fall time		t_f	-	179	-	ns
Turn-on energy		E_{on}	-	11.1	-	mJ
Turn-off energy		E_{off}	-	6.45	-	mJ
Total switching energy		E_{ts}	-	17.55	-	mJ
Turn-on delay time	$V_{CE} = 400\text{V}$, $I_C = 150\text{A}$, $R_g = 5.5\Omega$, $V_{GE} = 15\text{V}$, $T_j = 150^\circ\text{C}$	$t_{d(on)}$	-	63	-	ns
Rise time		t_r	-	257	-	ns
Turn-off delay time		$t_{d(off)}$	-	238	-	ns
Fall time		t_f	-	207	-	ns
Turn-on energy		E_{on}	-	11.8	-	mJ
Turn-off energy		E_{off}	-	7.34	-	mJ
Total switching energy		E_{ts}	-	19.14	-	mJ
Gate charge	$V_{CE} = 400\text{V}$, $I_C = 120\text{A}$, $V_{GE} = 15\text{V}$	Q_g	-	419	-	nC

Module						
Parameter	Conditons	Symbol	Min.	Typ.	Max.	Units
Stray inductance		L_{CE}			30	nH
Thermal resistance	per IGBT	$R_{th(j-c)}$			0.16	$^\circ\text{C/W}$
	per Diode				0.25	
Mounting torque	to terminal M5	F	2.5		5.0	Nm
	to heatsink M6		3.0		5.0	
Weight		W			150	g



Diode						
Parameter	Conditons	Symbol	Min.	Typ.	Max.	Units
Diode forward voltage	$I_F=150A, T_j = 25^{\circ}C$	V_F	-	1.8	2.5	V
	$I_F=150A, T_j = 150^{\circ}C$		-	1.35	-	
Diode reverse recovery time	$I_F=0.5A, I_R=1.0A, I_{rr}=0.25A,$	t_{rr}	-	50	-	ns
Diode reverse recovery time	$I_F = 150A,$ $di/dt=250A/uS$	t_{rr}	-	110	-	uC
Diode peak reverse recovery current		I_{RRM}	-	7.1	-	A
Diode reverse recovery charge		Q_{rr}	-	185	-	mJ
Maximum Instantaneous Reverse	$V_R = 650V, T_c = 25^{\circ}C$	I_R	-	-	5.0	μA
	$V_R = 650V, T_c = 150^{\circ}C$		-	-	1.0	mA

Circuit Schematic



Package Outline

(All dimensions in mm)

