

## “HALF-BRIDGE” IGBT

### Features

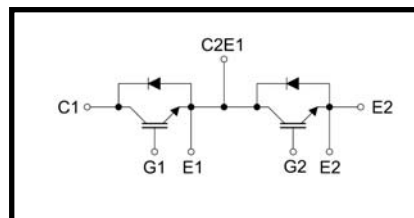
- IGBT NPT Technology
- 10μs Short circuit capability
- Low turn-off losses
- Short tail current
- Positive  $V_{CE(on)}$  temperature coefficient

### Applications

- AC & DC Motor controls
- General purpose inverters
- Optimized for high current inverter (AC TIG Welding machines)
- Servo Controls
- UPS, Robotics



$V_{CES} = 1200V$
$I_c = 75A$
$V_{CE(ON)} \text{ typ.} = 2.8V$
@ $I_c = 75A$



### Absolute Maximum Ratings @ $T_c = 25^\circ C$ (per leg)

Symbol	Parameter	Condition	Ratings	Unit
$V_{CES}$	Collector-to-Emitter Voltage	$V_{GE} = 0V, I_c = 500\mu A$	1200	V
$V_{GES}$	Gate emitter voltage		$\pm 20$	V
$I_c$	Continuous Collector Current	$T_c = 70^\circ C (25^\circ C)$	75 (100)	A
$I_{CM}$	Pulsed collector current	$T_c = 70^\circ C (25^\circ C)$	150 (200)	A
$I_F$	Diode Continuous Forward Current	$T_c = 70^\circ C (25^\circ C)$	75 (100)	A
$I_{FM}$	Diode Maximum Forward Current		200	A
$T_{SC}$	Short Circuit Withstand Time	$T_c = 100^\circ C$	10	$\mu s$
$V_{iso}$	Isolation Voltage test	AC 1 minute	2500	V
$T_j$	Junction Temperature		-40 ~ 150	$^\circ C$
$T_{stg}$	Storage Temperature		-40 ~ 125	$^\circ C$
Weight	Weight of Module		190	g
Mounting	Power Terminal Screw : M5		3.5	Nm
Torque	Terminal connection Screw : M5		3.5	Nm

### Electrical Characteristics @ $T_j = 25^\circ C$ (unless otherwise specified)

Symbol	Parameters	Min	Typ	Max	Unit	Test conditions
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	1200	-	-	V	$V_{GE} = 0V, I_c = 500\mu A$
$V_{CE(ON)}$	Collector-to-Emitter Saturation Voltage	-	2.8	3.05		$I_c = 75A, V_{GE} = 15V$
$V_{GE(th)}$	Gate Threshold Voltage	4.0	5.0	6.0		$V_{CE} = V_{GE}, I_c = 250\mu A$
$I_{CES}$	Zero Gate Voltage Collector Current	-	-	500	$\mu A$	$V_{GE} = 0V, V_{CE} = 1200V$
$I_{GES}$	Gate-to-Emitter Leakage Current	-	-	$\pm 100$	nA	$V_{CE} = 0V, V_{GE} = \pm 20V$
$V_{FM}$	Diode Forward Voltage Drop	-	2.1	2.4	V	$I_c = 75A$

**Switching Characteristic @  $T_j = 25^\circ\text{C}$  (unless otherwise specified)**

Symbol	Parameters	Min	Typ	Max	Unit	Test conditions
$C_{ies}$	Input capacitance	-	4300	-	pF	$V_{CC} = 30V, V_{GE} = 0V$ $f = 1.0MHz$
$C_{oss}$	Output capacitance	-	395	-		
$C_{res}$	Reverse transfer capacitance	-	160	-		
$t_{d(on)}$	Turn-on delay time	-	72	94	ns	$T_j = 125^\circ\text{C}, V_{CC} = 600V$ $I_C = 75A, V_{GE} = 15V$ $R_G = 4.7\Omega$
$t_r$	Rise time	-	32	45		
$t_{d(off)}$	Turn-off delay time	-	366	400		
$t_f$	Fall time	-	45	58		
$I_{rr}$	Diode Peak Reverse Recovery current	-	50	-	A	$T_j = 125^\circ\text{C}, V_{CC} = 600V$ $I_F = 60A, V_{GE} = 15V$ $R_G = 4.7\Omega$
$t_{rr}$	Diode Reverse Recovery time	-	180	-	ns	

**Thermal Characteristic Values**

Symbol	Parameters	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-Case (IGBT Part, Per 1/2 Module)	-	-	0.26	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-to-Case (Diode Part, Per 1/2 Module)	-	-	0.54	
$R_{\theta CS}$	Case-to-Heat Sink (Conductive grease applied)	-	0.05	-	

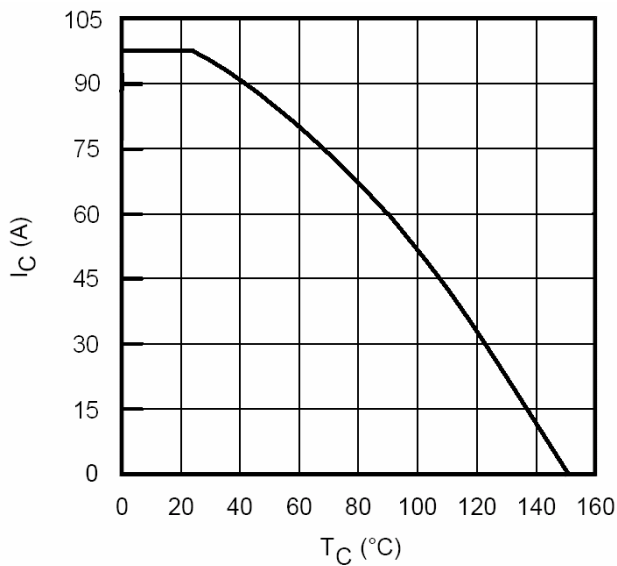


Fig 1. Maximum DC Collector Current vs. Case Temperature

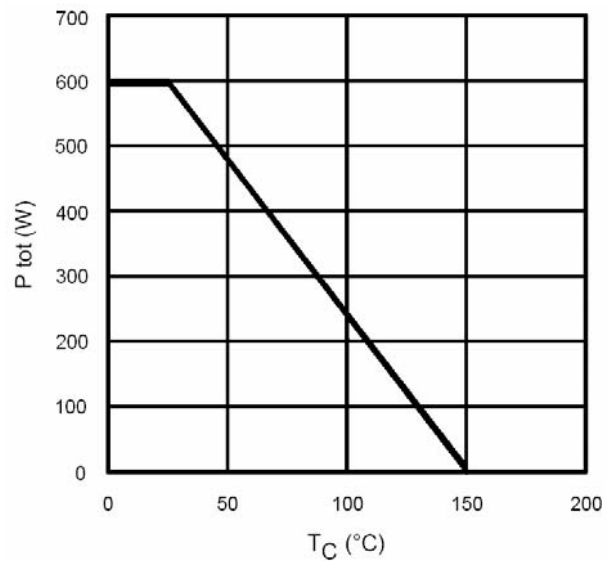


Fig 2. Power Dissipation vs. Case Temperature

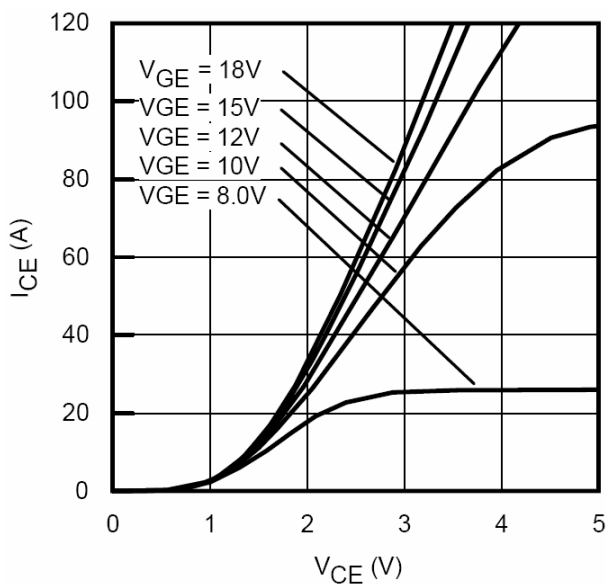


Fig 3. Typ. IGBT Output Characteristics  
 $T_J = 25^{\circ}C$ ;  $t_p = 80\mu s$

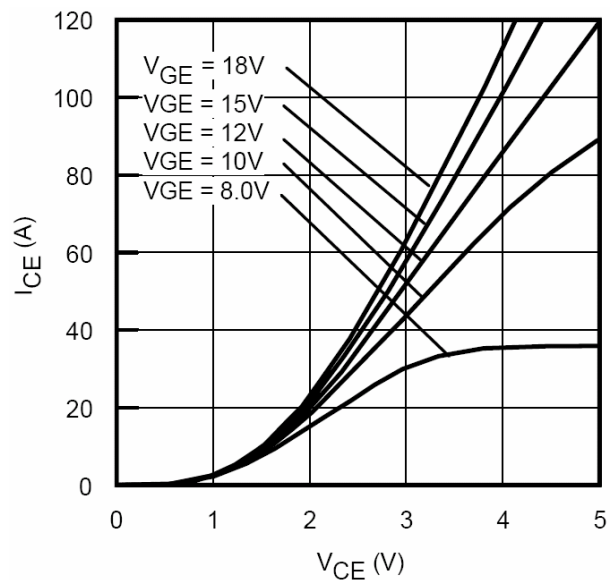
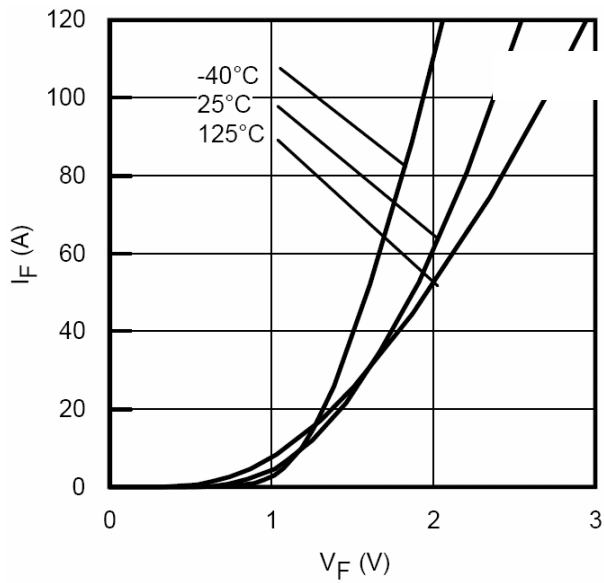
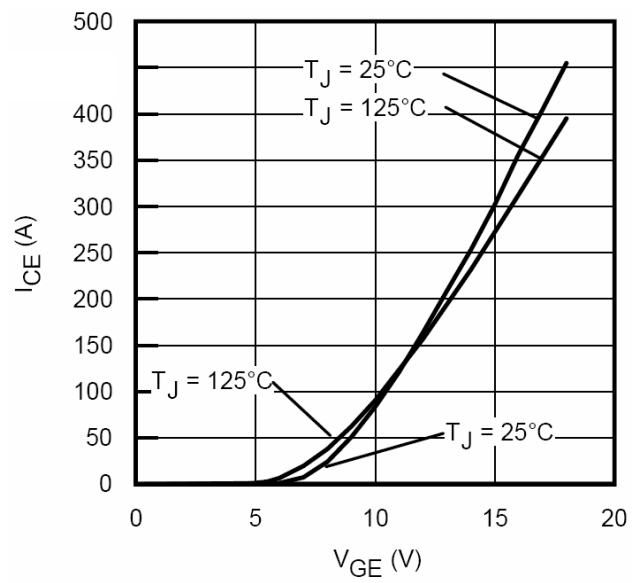


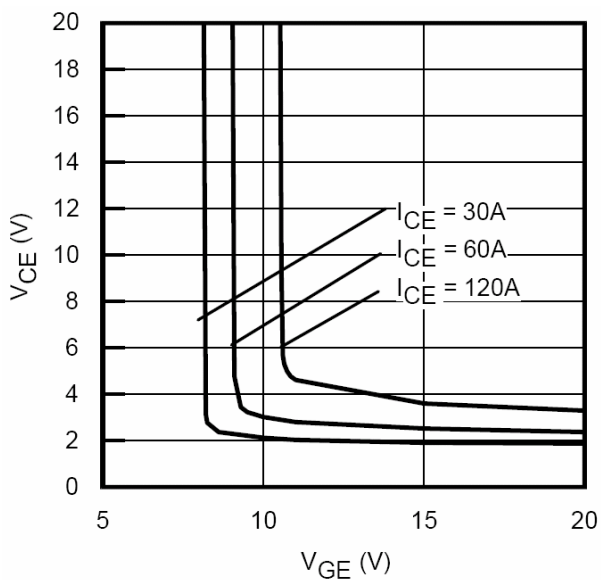
Fig 4. Typ. IGBT Output Characteristics  
 $T_J = 125^{\circ}C$ ;  $t_p = 80\mu s$



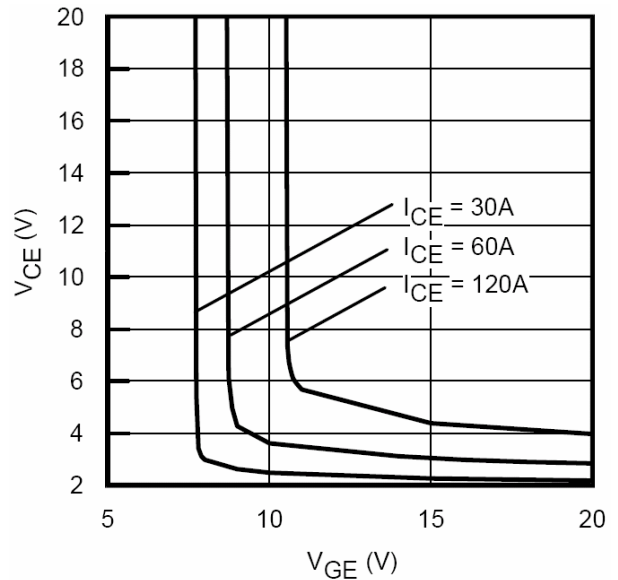
**Fig 5. Typ. Diode Forward Characteristics**  
 $t_p = 80\mu s$



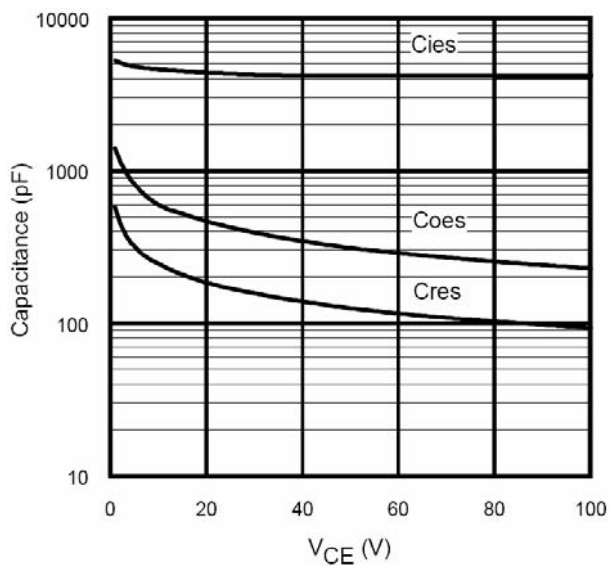
**Fig 6. Typ. Transfer Characteristics**  
 $V_{CE} = 50V; t_p = 10\mu s$



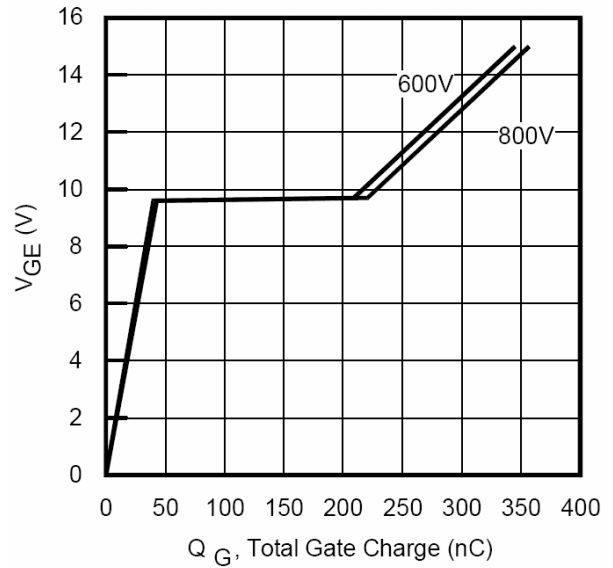
**Fig 7. Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = 25^\circ C$



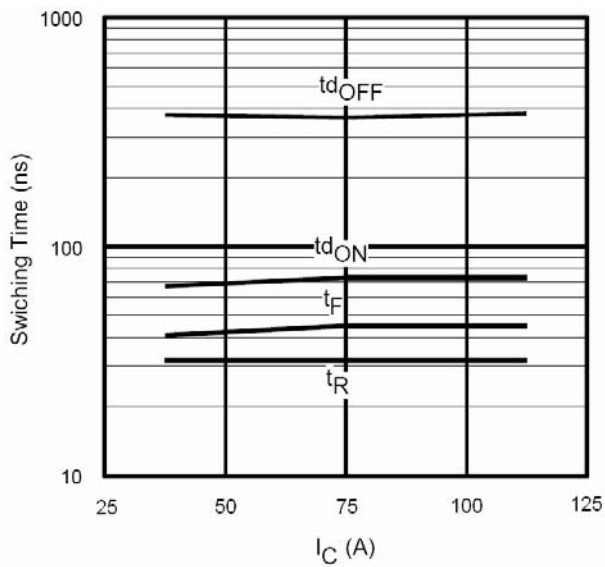
**Fig 8. Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = 125^\circ C$



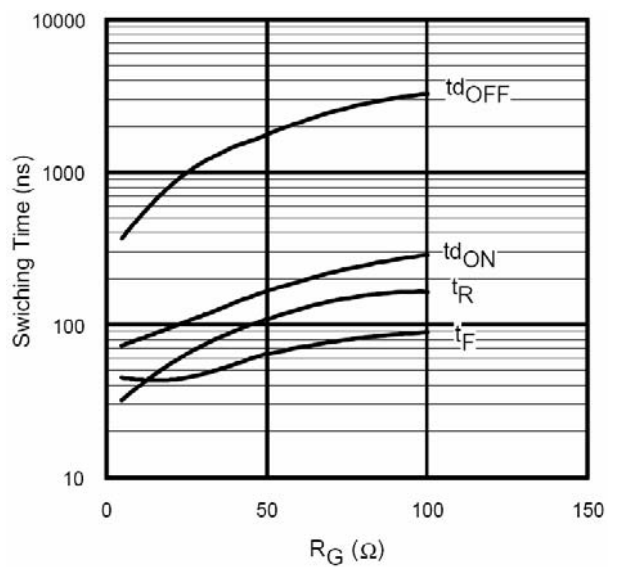
**Fig 9. Typ. Capacitance vs. Vce**  
 $V_{GE} = 0V; f = 1MHz$



**Fig 10. Typical Gate Charge vs. Vge**  
 $I_{CE} = 60A; L = 600\mu H$



**Fig 11. Typ. Switching Time vs. Ic**  
 $T_J = 125^\circ C; L = 200\mu H; V_{CE} = 600V$   
 $R_G = 4.7\Omega; V_{GE} = 15V$



**Fig 12. Typ. Switching Time vs. Rg**  
 $T_J = 125^\circ C; L = 200\mu H; V_{CE} = 600V$   
 $I_{CE} = 75A; V_{GE} = 15V$

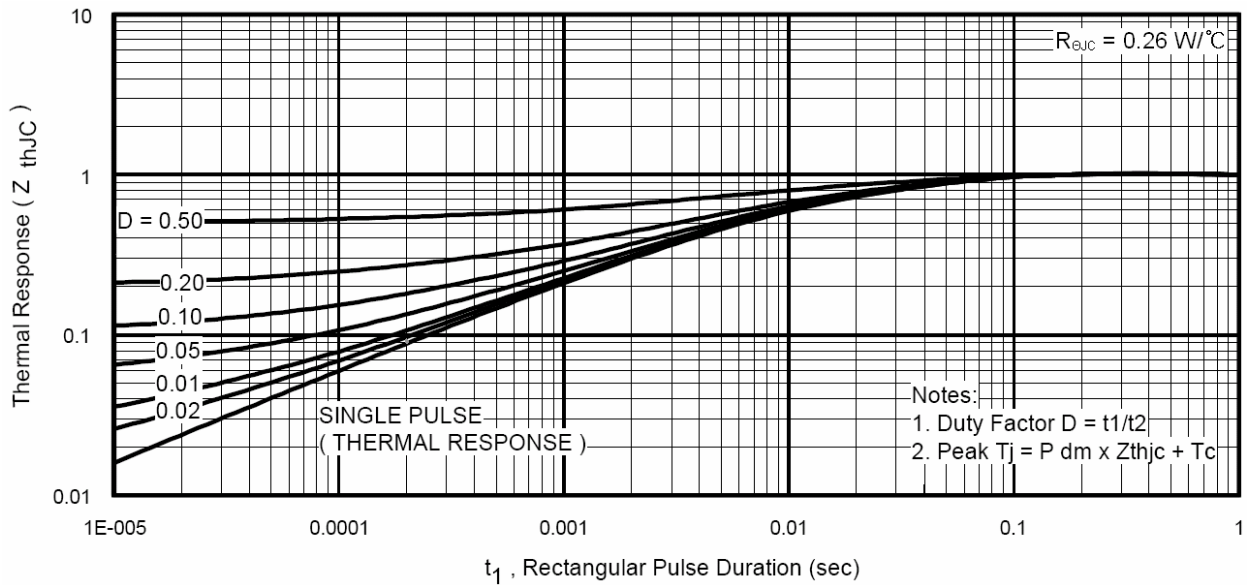


Fig 13. Normalized Transient Thermal Impedance, Junction-to-Case (IGBT)

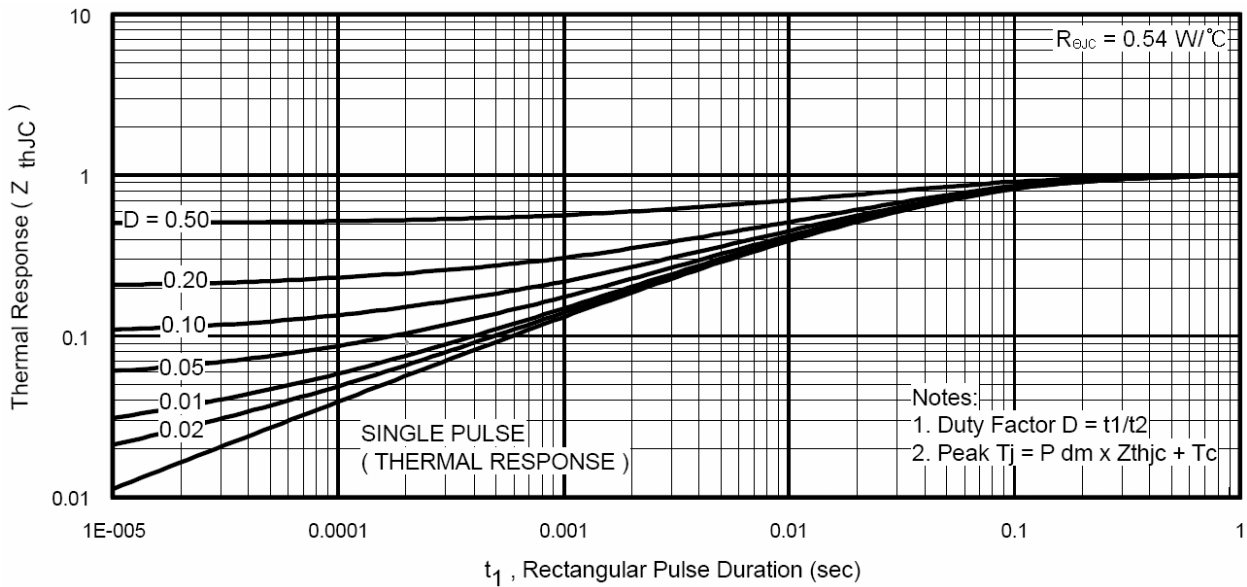


Fig 14. Normalized Transient Thermal Impedance, Junction-to-Case (DIODE)

**Package Outline** (dimensions in mm)

