

“HALF-BRIDGE” IGBT

Features

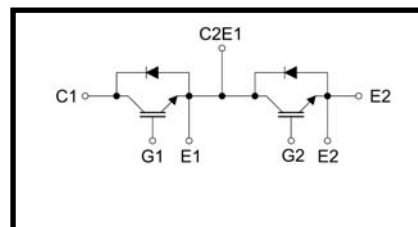
- IGBT NPT Technology
- 10μs Short circuit capability
- Low turn-off losses
- Short tail current
- Positive $V_{CE(on)}$ temperature coefficient

Applications

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



$V_{CES} = 1200V$
 $I_c = 150A$
 $V_{CE(ON)} \text{ typ.} = 2.8V$
 @ $I_c = 150A$



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

Symbol	Parameter	Condition	Ratings	Unit
V_{CES}	Collector-to-Emitter Voltage	$V_{GE} = 0V, I_c = 1.0mA$	1200	V
V_{GES}	Gate emitter voltage		± 20	V
I_c	Continuous Collector Current	$T_c = 70^\circ C (25^\circ C)$	150 (200)	A
I_{CM}	Pulsed collector current	$T_c = 70^\circ C (25^\circ C)$	300 (400)	A
I_F	Diode Continuous Forward Current	$T_c = 70^\circ C (25^\circ C)$	150 (200)	A
I_{FM}	Diode Maximum Forward Current		400	A
T_{SC}	Short Circuit Withstand Time	$T_c = 100^\circ C$	10	μs
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		360	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	$V_{GE} = 0V, I_c = 1.0mA$
$V_{CE(ON)}$	Collector-to-Emitter Saturation Voltage	-	2.8	3.05		$I_c = 150A, V_{GE} = 15V$
$V_{GE(th)}$	Gate Threshold Voltage	4.0	5.0	6.0		$V_{CE} = V_{GE}, I_c = 500\mu A$
I_{CES}	Zero Gate Voltage Collector Current	-	-	1.0	mA	$V_{GE} = 0V, V_{CE} = 1200V$
I_{GES}	Gate-to-Emitter Leakage Current	-	-	± 200	nA	$V_{CE} = 0V, V_{GE} = \pm 20V$
V_{FM}	Diode Forward Voltage Drop	-	2.1	2.4	V	$I_c = 150A$

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

Symbol	Parameters	Min	Typ	Max	Unit	Test conditions
C_{ies}	Input capacitance	-	8600	-	pF	$V_{CC} = 30V, V_{GE} = 0V$ $f = 1.0MHz$
C_{oss}	Output capacitance	-	790	-		
C_{res}	Reverse transfer capacitance	-	320	-		
$t_{d(on)}$	Turn-on delay time	-	72	94	ns	$T_j = 125^\circ\text{C}, V_{CC} = 600V$ $I_C = 150A, V_{GE} = 15V$ $R_G = 4.7\Omega$
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	$T_j = 125^\circ\text{C}, V_{CC} = 600V$ $I_F = 120A, V_{GE} = 15V$ $R_G = 4.7\Omega$
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)	-	-	0.15	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-to-Case (Diode Part, Per 1/2 Module)	-	-	0.30	
$R_{\theta CS}$	Case-to-Heat Sink (Conductive grease applied)	-	0.04	-	

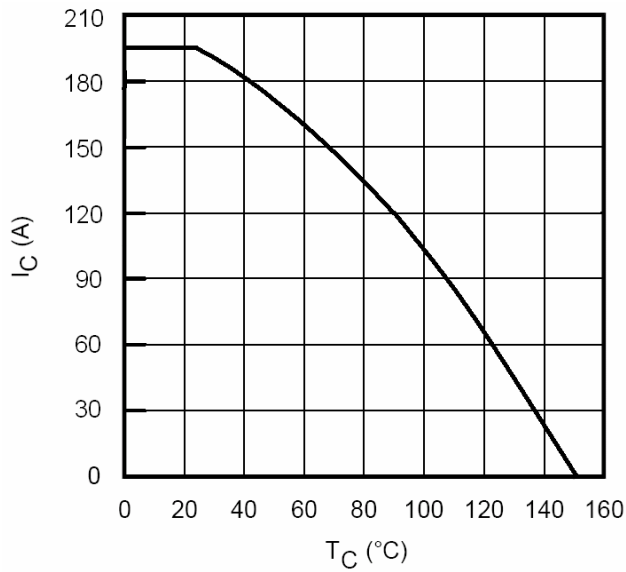


Fig 1. Maximum DC Collector Current vs. Case Temperature

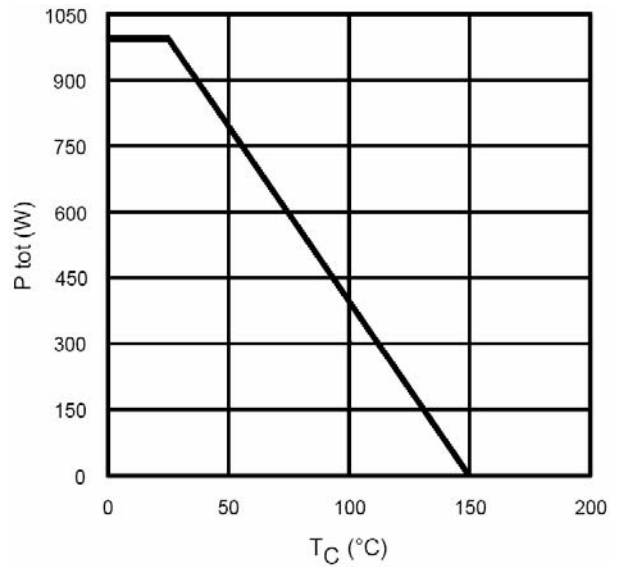


Fig 2. Power Dissipation vs. Case Temperature

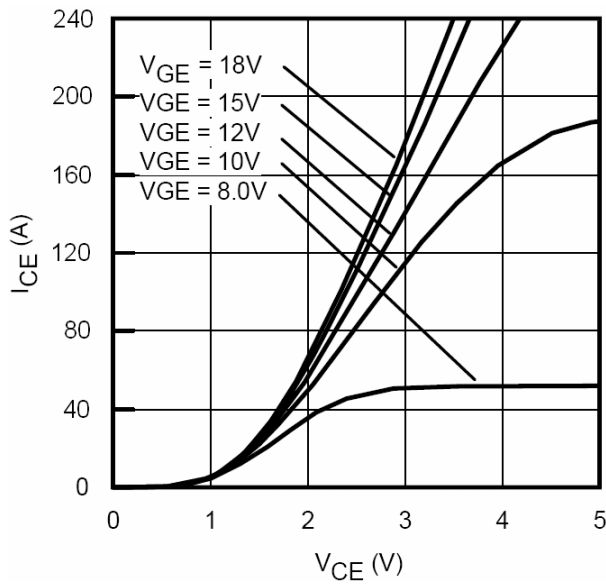


Fig 3. Typ. IGBT Output Characteristics
 $T_J = 25^{\circ}C$; $t_p = 80\mu s$

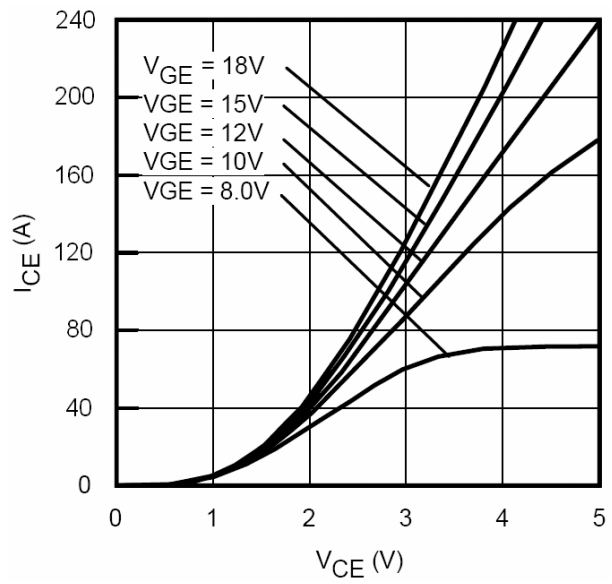


Fig 4. Typ. IGBT Output Characteristics
 $T_J = 125^{\circ}C$; $t_p = 80\mu s$

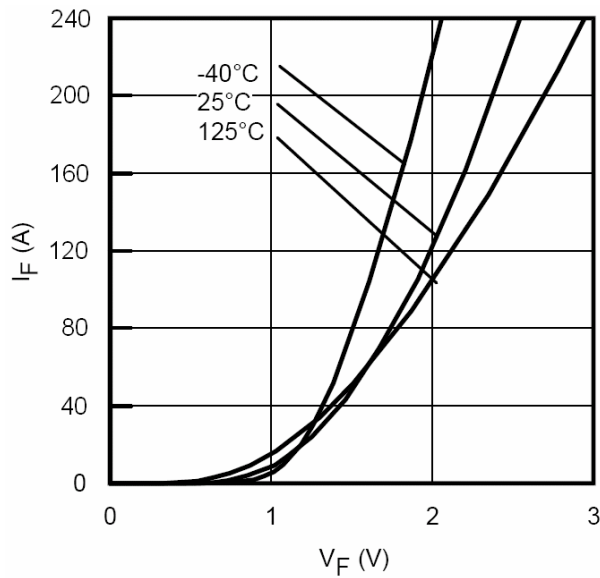


Fig 5. Typ. Diode Forward Characteristics
 $t_p = 80\mu\text{s}$

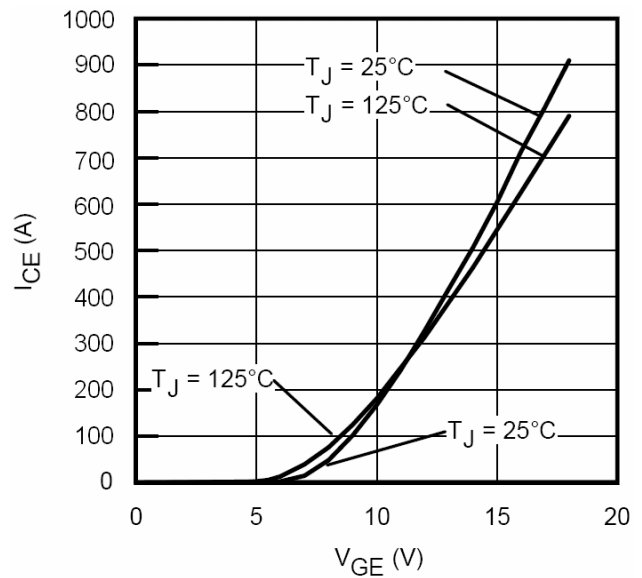


Fig 6. Typ. Transfer Characteristics
 $V_{CE} = 50\text{V}$; $t_p = 10\mu\text{s}$

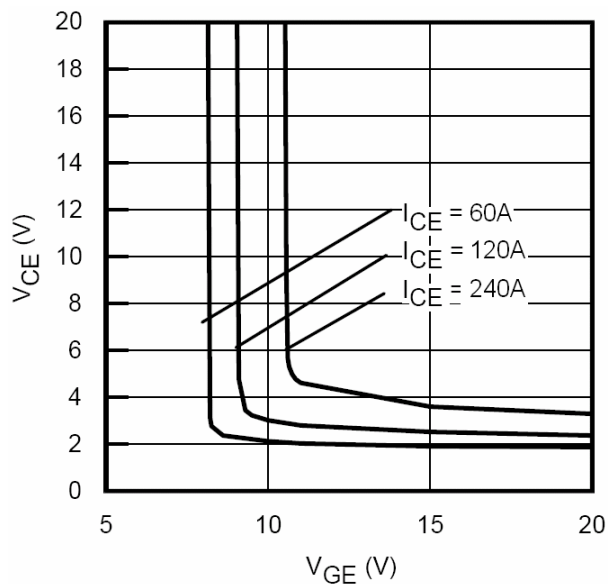


Fig 7. Typical V_{CE} vs. V_{GE}
 $T_J = 25^\circ\text{C}$

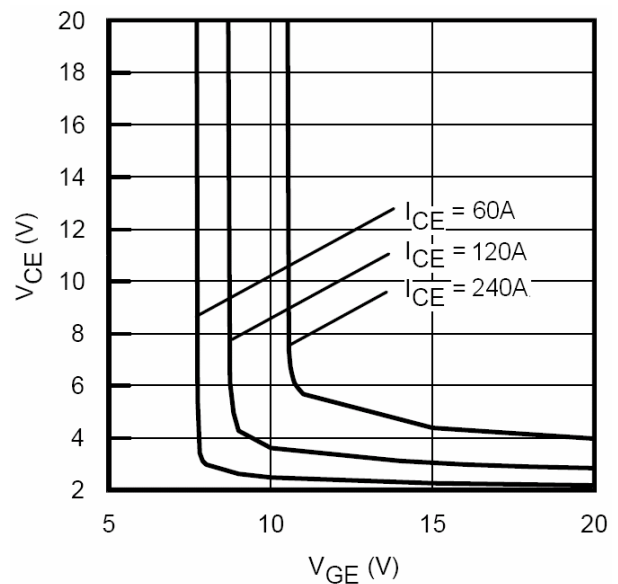


Fig 8. Typical V_{CE} vs. V_{GE}
 $T_J = 125^\circ\text{C}$

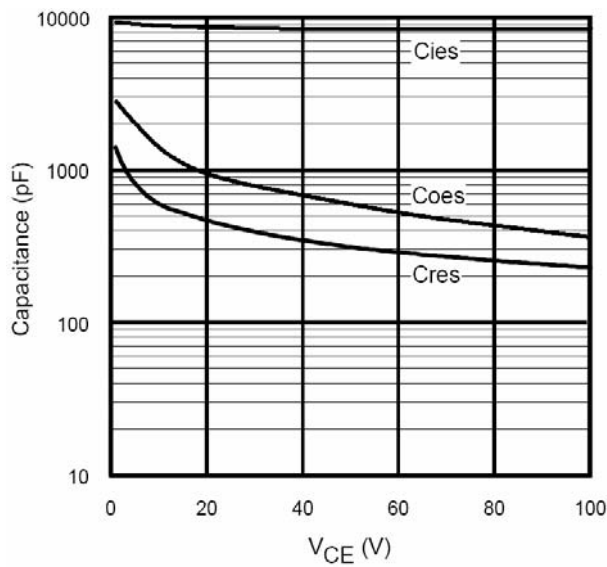


Fig 9. Typ. Capacitance vs. V_{ce}
V_{GE} = 0V; f = 1Mhz

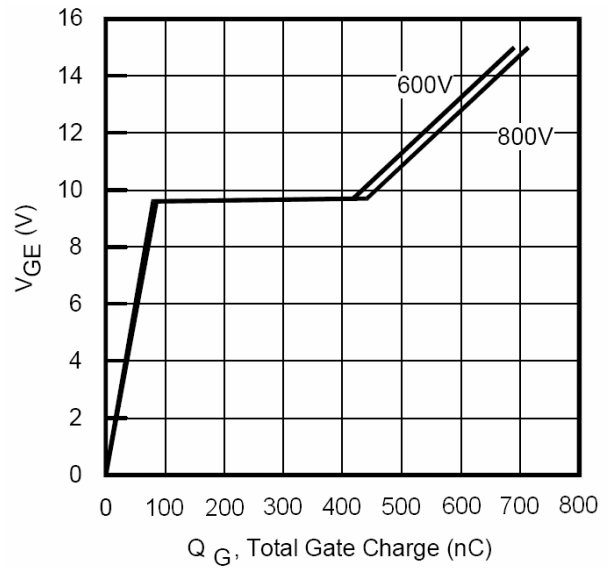


Fig 10. Typical Gate Charge vs. V_{ge}
I_{CE} = 120A; L = 600μH

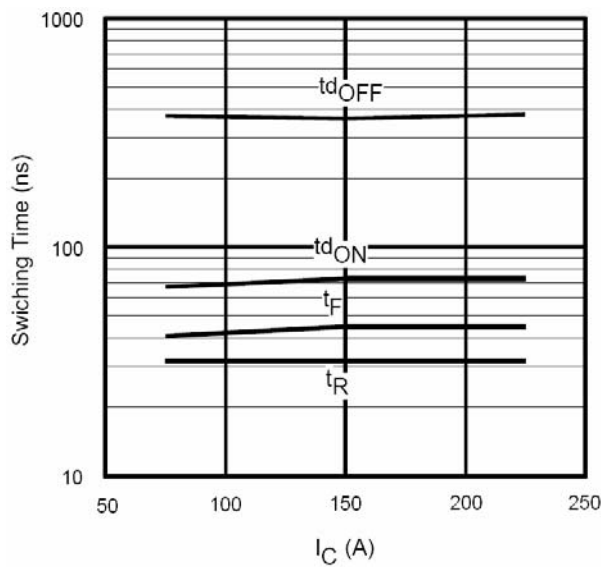


Fig 11. Typ. Switching Time vs. I_c
T_J = 125°C; L = 200μH; V_{CE} = 600V
R_G = 4.7Ω; V_{GE} = 15V

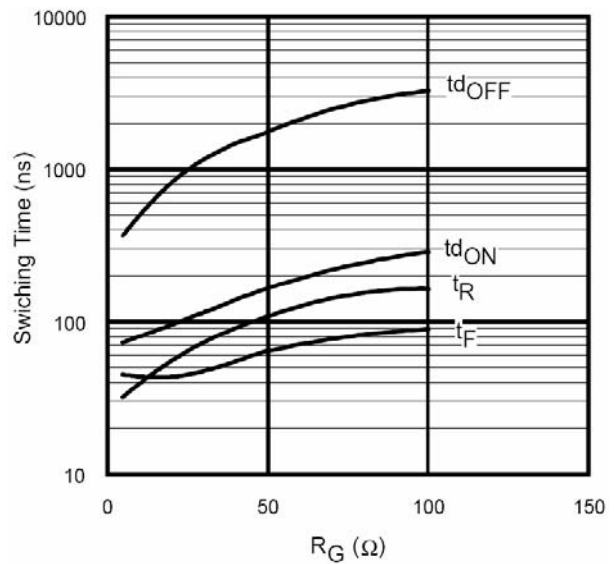


Fig 12. Typ. Switching Time vs. R_g
T_J = 125°C; L = 200μH; V_{CE} = 600V
I_{CE} = 150A; V_{GE} = 15V

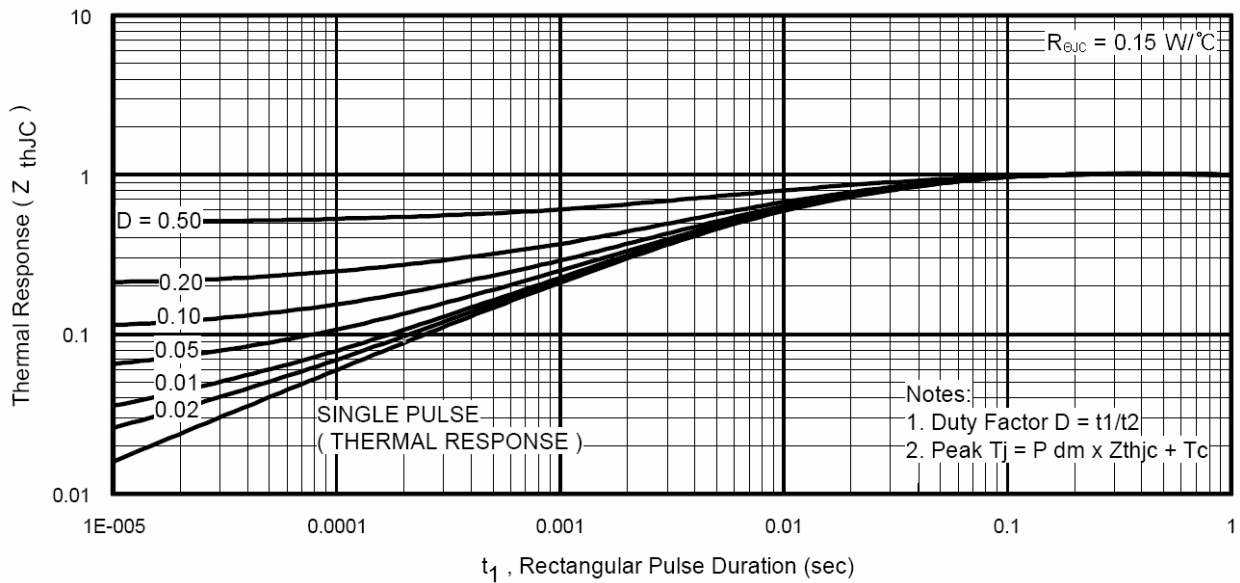


Fig 13. Normalized Transient Thermal Impedance, Junction-to-Case (IGBT)

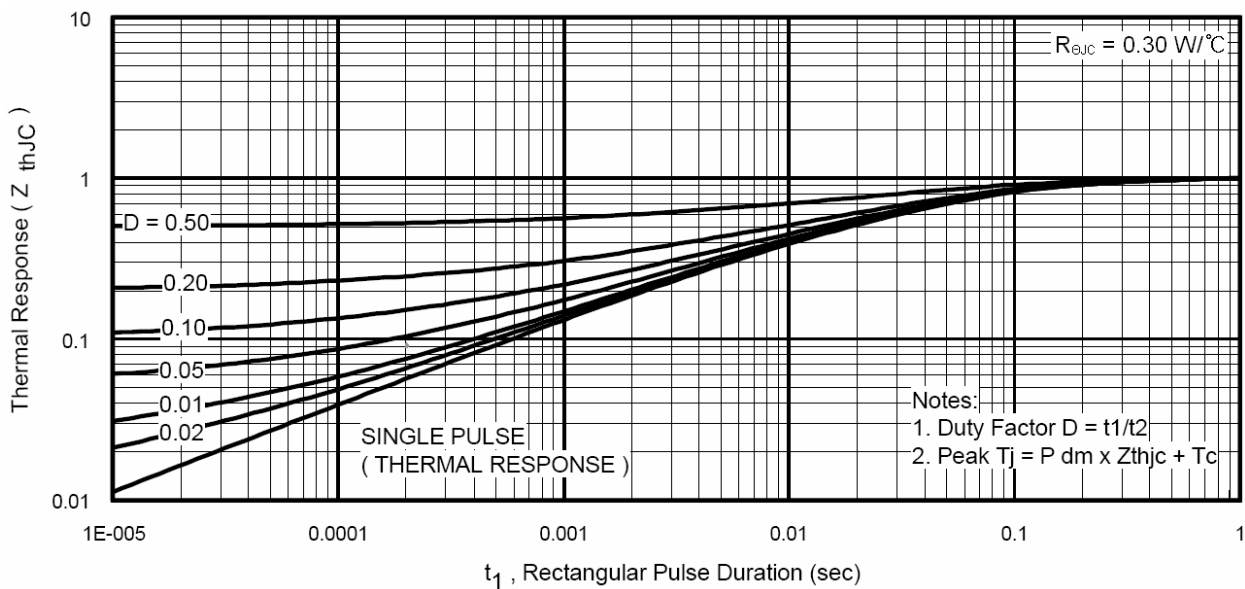


Fig 14. Normalized Transient Thermal Impedance, Junction-to-Case (DIODE)

