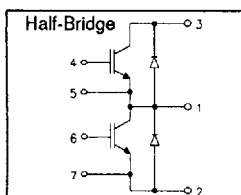


"HALF-BRIDGE" INT-A-PAK™ MODULES

Fast™ IGBT

- Rugged Design
- Simple gate-drive
- Fast operation up to 10 kHz hard switching, or 50 kHz resonant
- Switching-Loss Rating includes all "tail" losses
- Short circuit rated



$$V_{CE} = 1200V$$

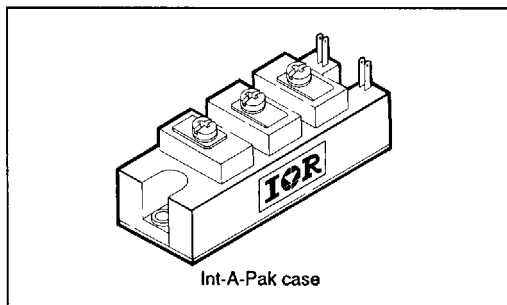
$$I_{C(DC)} = 100A$$

$$V_{CE(SAT)} < 2.8V$$

$$t_{SC} > 10\mu\text{sec}$$

Description

IR's advanced IGBT technology is the key to this line of INT-A-pak Power Modules. The efficient geometry and unique processing of the IGBT allow higher current densities than comparable bipolar power module transistors, while at the same time requiring the simpler gate-drive of the familiar power MOSFET. These modules are short circuit rated for applications such as motor control requiring this important feature.



Absolute Maximum Ratings

Parameter	Description	Value	Units
$I_C @ T_C = 25^\circ\text{C}$	Continuous collector current	100	A
$I_C @ T_C = 100^\circ\text{C}$	Continuous collector current	60	
I_{LM}	Peak switching current	200	
I_{FM}	Peak diode forward current (1)	200	V
V_{CE}	Continuous collector to emitter voltage	1200	
V_{GE}	Gate to emitter voltage	± 20	
V_{ISOL}	RMS isolation voltage, any terminal to case, $t = 1 \text{ min}$	2500	W
$P_D @ T_C = 25^\circ\text{C}$	Power dissipation	500	
T_J	Operating junction temperature range	-40 to 150	$^\circ\text{C}$
T_{STG}	Storage temperature range	-40 to 125	

(1) Duration limited by max junction temperature.

IRGTI0100M12

Electrical Characteristics - $T_J = 25^\circ\text{C}$, unless otherwise stated

Parameter	Description	Min	Typ	Max	Units	Test Conditions
$V_{(BR)CES}$	Collector-to-emitter breakdown voltage	1200	---	---	V	$V_{GE} = 0V, I_C = 2mA$
$V_{CE(ON)}$	Collector-to-emitter voltage	---	2.4	2.8		$V_{GE} = 15V, I_C = 100A$
		$T_J = 150^\circ\text{C}$	---	1.9		---
V_{FM}	Diode forward voltage - maximum	---	---	3.2		$I_F = 100A$
		$T_J = 150^\circ\text{C}$	---	2.7		---
V_{GEth}	Gate threshold voltage	3.0	---	5.5	$I_C = 1mA$	
ΔV_{GEth}	Threshold voltage temperature coefficient	---	-11	---	mV/°C	$V_{CE} = V_{GE}, I_C = 1mA$
g_{fe}	Forward transconductance	35	---	70	s	$V_{CE} = 25V, I_C = 100A$
I_{CES}	Collector-to-emitter leakage current	---	---	2	mA	$V_{GE} = 0V, V_{CE} = 1200V$
		$T_J = 150^\circ\text{C}$	---	20		
I_{GES}	Gate-to-emitter leakage current	---	---	± 2	μA	$V_{GE} = \pm 20V$

Dynamic Characteristics - $T_J = 125^\circ\text{C}$

Parameter	Description	Min	Typ	Max	Units	Test Conditions
E_{on}	Turn-on switching energy	---	0.19	---	mJ/A	$R_G = 6.8\Omega, V_{CC} = 600V$
E_{off}	Turn-off switching energy	---	0.36	---		$I_C = 100A$
$E_{ts(1)}$	Total switching energy	---	---	0.6		$V_{GE} = \pm 15V$
$t_{d(on)}$	Turn-on delay time	---	150	250	ns	$R_G = 6.8\Omega, V_{CC} = 600V$
t_r	Rise time	---	300	450		$I_C = 100A$
$t_{d(off)}$	Turn-off delay time	---	200	300		$V_{GE} = \pm 15V$
t_f	Fall time	---	650	---		$L_S = 100nH$
I_{rr}	Diode peak recovery current	---	48	---	A	$R_G = 6.8\Omega, V_{CC} = 600V$
t_{rr}	Diode peak recovery time	---	220	---		$I_C = 100A$
Q_{rr}	Diode peak recovery charge	---	6	---		$V_{GE} = \pm 15V$
Q_{ge}	Gate-to-emitter charge (turn-on)	45	---	175	nC	$V_{CC} = 600V$
Q_{gc}	Gate-to-collector charge (turn-on)	160	---	330		$I_C = 100A$
Q_g	Total gate charge (turn-on)	500	---	900		$V_{GE} = 15V$
C_{ies}	Input capacitance	10500	---	11000	pF	$V_{GE} = 0V$
C_{oes}	Output capacitance	650	---	1100		$V_{CC} = 30V$
C_{res}	Reverse transfer capacitance	650	---	1000		$f = 1MHz$
t_{sc}	Short circuit withstand time	10	---	---	μs	$V_{CC} = 750V, V_{GE} = \pm 15V$ min. $R_G = 6.8\Omega, V_{CEP} = 1000V$

(1) Includes "Tail" losses

Thermal and Mechanical Characteristics

Parameter	Description	Typ	Max	Units
R_{thJC} (IGBT)	Thermal resistance, junction to case, each IGBT	---	0.25	°C/W
R_{thJC} (Diode)	Thermal resistance, junction to case, each diode	---	0.28	
R_{thCS} (Module)	Thermal resistance, case to sink	0.1	---	
Wt	Weight of module	150	---	g

Ordering Information Table

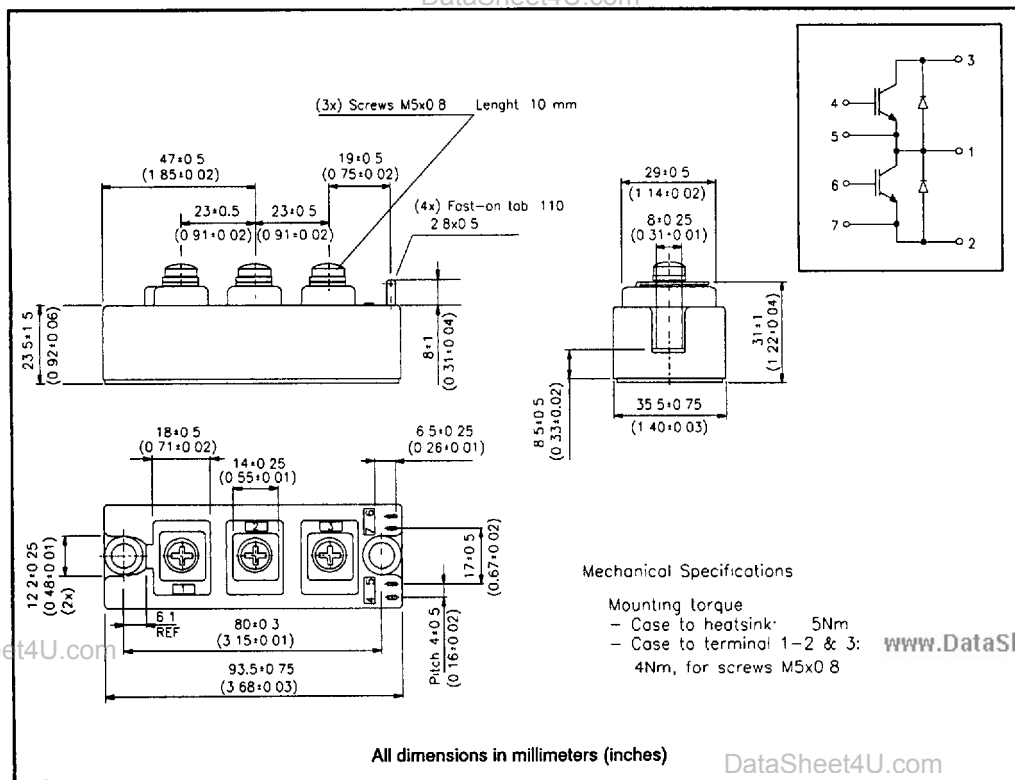
Device Code

1	2	3	4	5	6	7
IR	G	T	I	0100	M	12

- 1** - IR Logo
2 - IGBT
3 - Function: T = Half-Bridge
4 - Package: I = Int-A-Pak
5 - Current rating: 0100 = 100A
6 - Speed: M = Fast, short circuit rated
7 - Voltage rating: 12 = 1200V

Outline Table

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IRGT10100M12

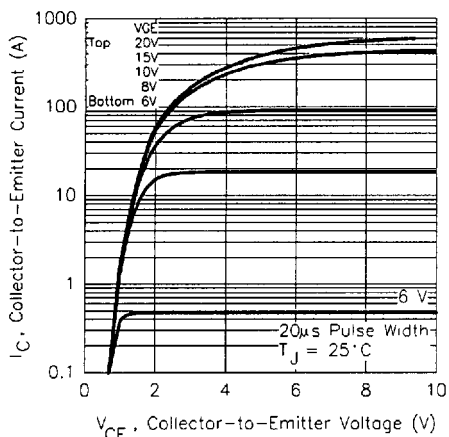
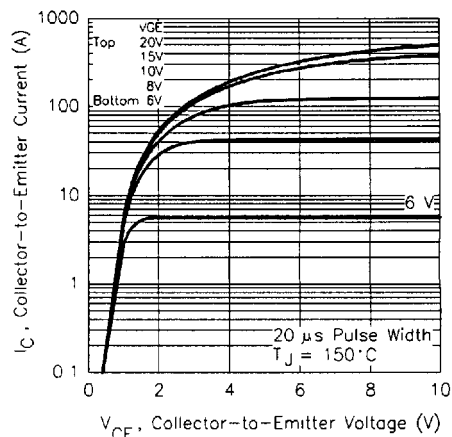
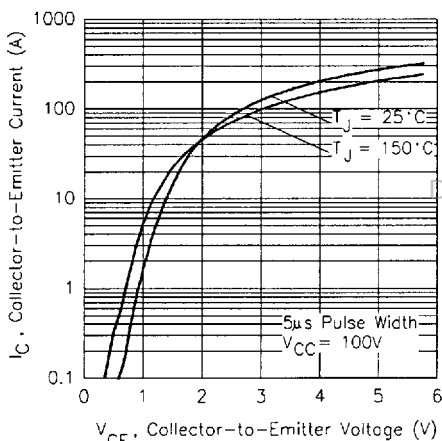
Fig. 1 - Typical Output Characteristics, $T_J = 25^\circ\text{C}$ Fig. 2 - Typical Output Characteristics, $T_J = 150^\circ\text{C}$ 

Fig. 3 - Typical Output Characteristics

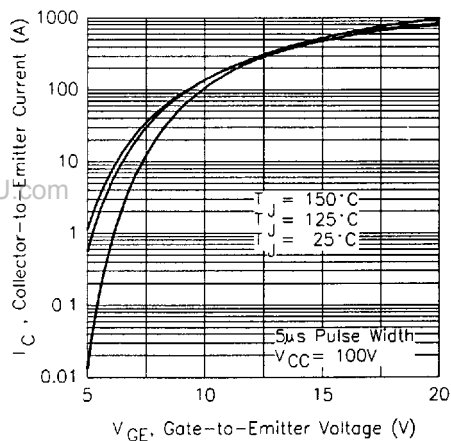


Fig. 4 - Typical Transfer Characteristics

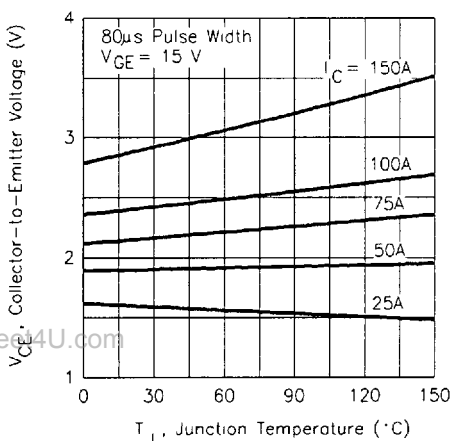
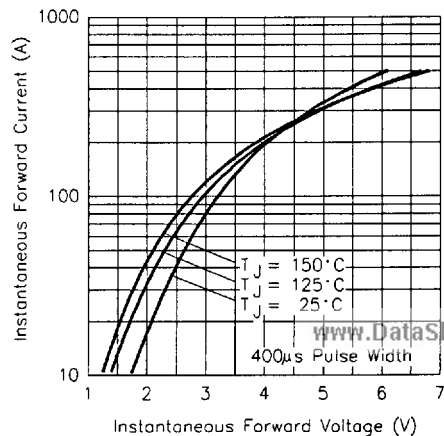
Fig. 5 - Collector-to-Emitter Saturation
Typical Voltage vs. Junction Temperature

Fig. 6 - Forward Voltage Drop Characteristics

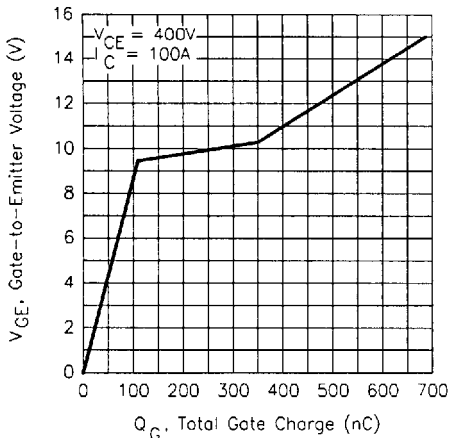


Fig. 7 - Typical Gate Charge vs. Gate-to-Emitter Voltage

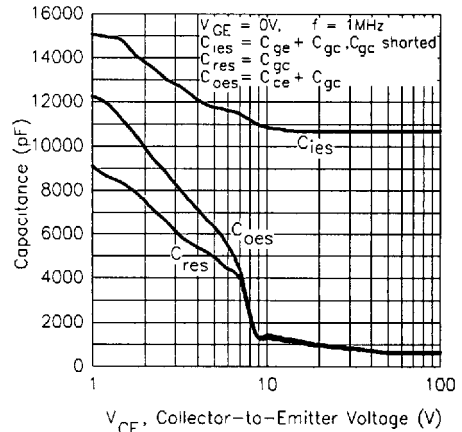


Fig. 8 - Typical Capacitance vs. Collector-to-Emitter Voltage

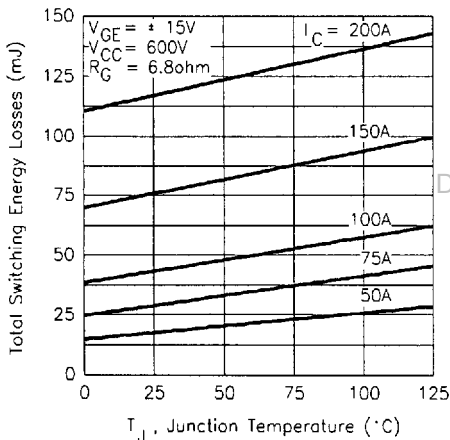


Fig. 9 - Typical Switching Losses vs. Junction Temperature

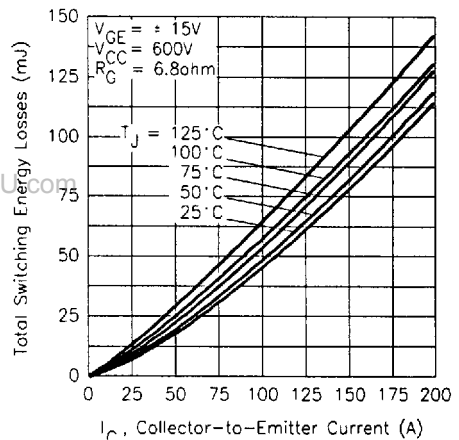


Fig. 10 - Typical Switching Losses vs. Collector-to-Emitter Current

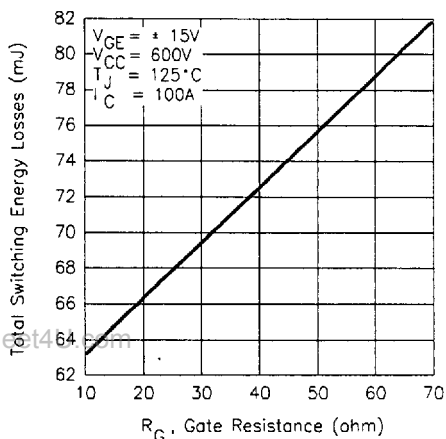


Fig. 11 - Typical Switching Losses vs. Gate Resistance

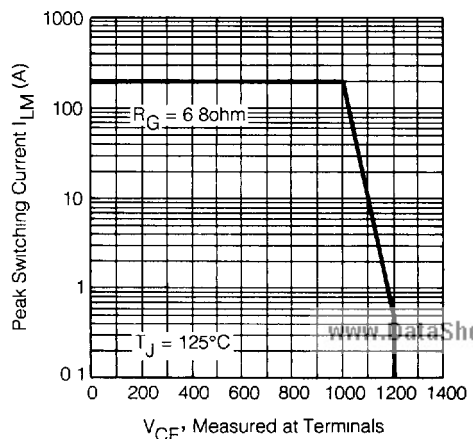


Fig. 12 - Safe Operating Area for Repetitive Switching

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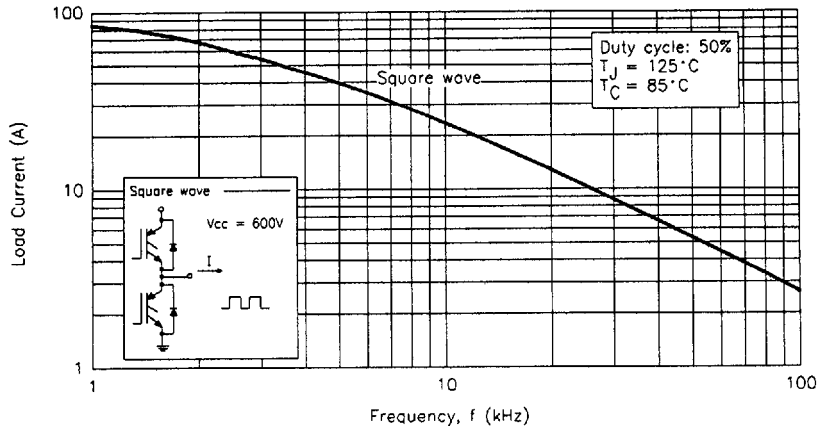


Fig. 13 - Typical Load Current vs. Frequency
 (For square wave, $I = I_{RMS}$ of fundamental; for triangular wave, $I = I_{pk}$)

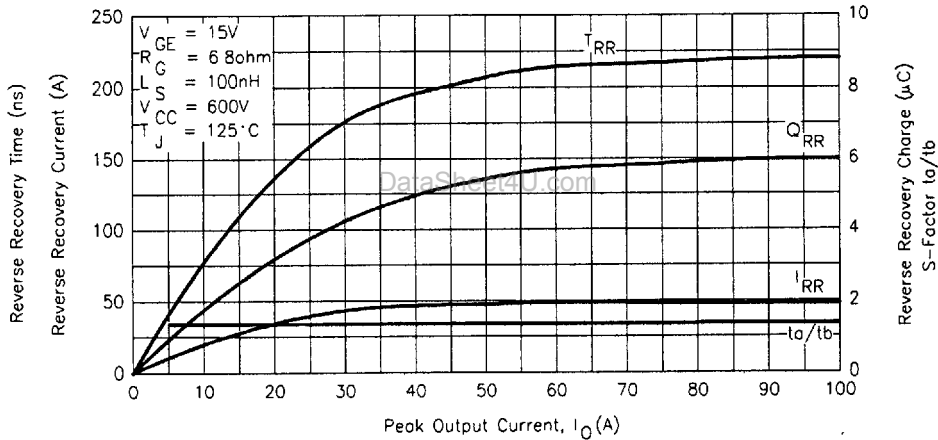


Fig. 14 - Typical Diode Recovery Characteristics as Function of Output Current I_O

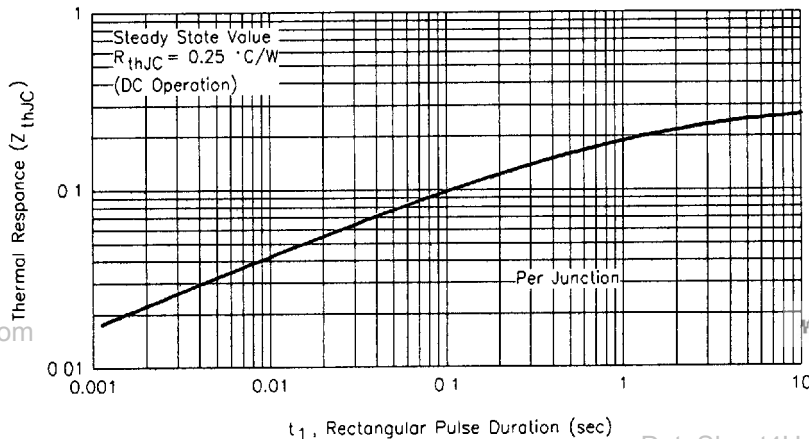
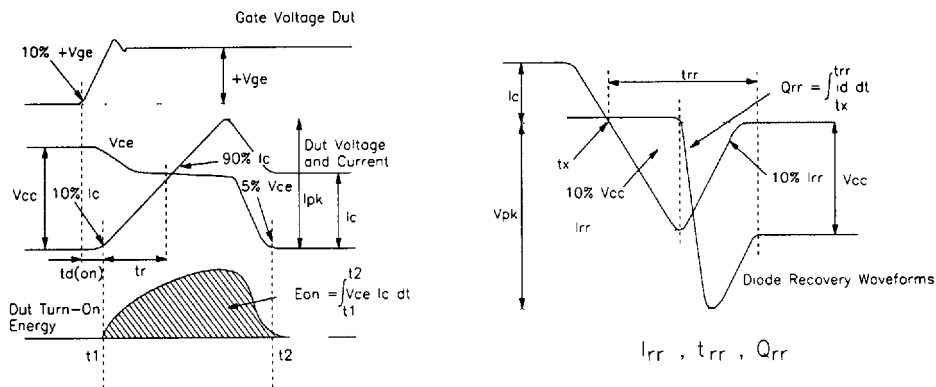


Fig. 15 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

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Fig. 19 - Test Waveforms for Circuit of Fig. 17, Defining E_{ON} , E_{REC} , Q_{RR}

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