



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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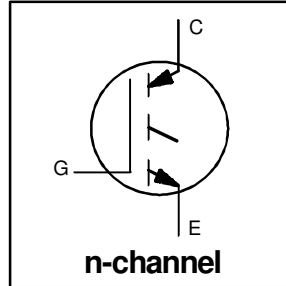
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Features

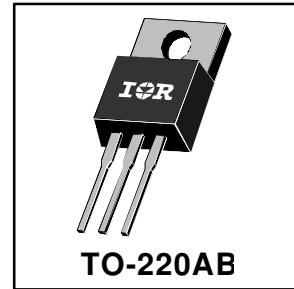
- Switching-loss rating includes all "tail" losses
- Optimized for high operating frequency (over 5kHz)
See Fig. 1 for Current vs. Frequency curve



$V_{CES} = 600V$
$V_{CE(sat)} \leq 3.0V$
@ $V_{GE} = 15V, I_C = 6.5A$

Description

Insulated Gate Bipolar Transistors (IGBTs) from International Rectifier have higher usable current densities than comparable bipolar transistors, while at the same time having simpler gate-drive requirements of the familiar power MOSFET. They provide substantial benefits to a host of high-voltage, high-current applications.



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	600	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	13	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	6.5	
I_{CM}	Pulsed Collector Current ①	52	
I_{LM}	Clamped Inductive Load Current ②	52	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
E_{ARV}	Reverse Voltage Avalanche Energy ③	5	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	60	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	24	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C
	Soldering Temperature, for 10 sec.	300 (0.063 in. (1.6mm) from case)	
	Mounting torque, 6-32 or M3 screw.	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	2.1	°C/W
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	—	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	—	80	
Wt	Weight	—	2.0 (0.07)	—	g (oz)

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions	
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	600	—	—	V	$V_{GE} = 0V, I_C = 250\mu A$	
$V_{(BR)ECS}$	Emitter-to-Collector Breakdown Voltage ^④	20	—	—	V	$V_{GE} = 0V, I_C = 1.0A$	
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	0.69	—	V/°C	$V_{GE} = 0V, I_C = 1.0mA$	
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	2.2	3.0	V	$V_{GE} = 15V$ See Fig. 2, 5	
		—	2.8	—			$I_C = 6.5A$
		—	2.5	—			$I_C = 13A$ $I_C = 6.5A, T_J = 150^\circ\text{C}$
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	5.5		$V_{CE} = V_{GE}, I_C = 250\mu A$	
$\Delta V_{GE(th)}/\Delta T_J$	Temperature Coeff. of Threshold Voltage	—	-11	—	mV/°C	$V_{CE} = V_{GE}, I_C = 250\mu A$	
g_{fe}	Forward Transconductance ^⑤	1.4	4.3	—	S	$V_{CE} = 100V, I_C = 6.5A$	
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	$V_{GE} = 0V, V_{CE} = 600V$	
		—	—	1000		$V_{GE} = 0V, V_{CE} = 600V, T_J = 150^\circ\text{C}$	
I_{GES}	Gate-to-Emitter Leakage Current	—	—	± 100	nA	$V_{GE} = \pm 20V$	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge (turn-on)	—	16	22	nC	$I_C = 6.5A$ $V_{CC} = 400V$ $V_{GE} = 15V$ See Fig. 8
Q_{ge}	Gate - Emitter Charge (turn-on)	—	2.5	3.8		
Q_{gc}	Gate - Collector Charge (turn-on)	—	7.8	13		
$t_{d(on)}$	Turn-On Delay Time	—	22	—	ns	$T_J = 25^\circ\text{C}$ $I_C = 6.5A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 50\Omega$ Energy losses include "tail"
t_r	Rise Time	—	12	—		
$t_{d(off)}$	Turn-Off Delay Time	—	71	95		
t_f	Fall Time	—	91	280		
E_{on}	Turn-On Switching Loss	—	0.11	—	mJ	See Fig. 9, 10, 11, 14
E_{off}	Turn-Off Switching Loss	—	0.14	—		
E_{ts}	Total Switching Loss	—	0.25	0.50		
$t_{d(on)}$	Turn-On Delay Time	—	23	—	ns	$T_J = 150^\circ\text{C}$, $I_C = 6.5A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 50\Omega$ Energy losses include "tail"
t_r	Rise Time	—	13	—		
$t_{d(off)}$	Turn-Off Delay Time	—	140	—		
t_f	Fall Time	—	200	—		
E_{ts}	Total Switching Loss	—	0.45	—	mJ	See Fig. 10, 14
L_E	Internal Emitter Inductance	—	7.5	—	nH	Measured 5mm from package
C_{ies}	Input Capacitance	—	330	—	pF	$V_{GE} = 0V$ $V_{CC} = 30V$ $f = 1.0MHz$ See Fig. 7
C_{oes}	Output Capacitance	—	65	—		
C_{res}	Reverse Transfer Capacitance	—	6.0	—		

Notes:

- ① Repetitive rating; $V_{GE}=20V$, pulse width limited by max. junction temperature. (See fig. 13b)
- ② $V_{CC}=80\%(V_{CES}), V_{GE}=20V, L=10\mu H, R_G=50\Omega$, (See fig. 13a)
- ③ Repetitive rating; pulse width limited by maximum junction temperature.
- ④ Pulse width $\leq 80\mu s$; duty factor $\leq 0.1\%$.
- ⑤ Pulse width 5.0 μs , single shot.

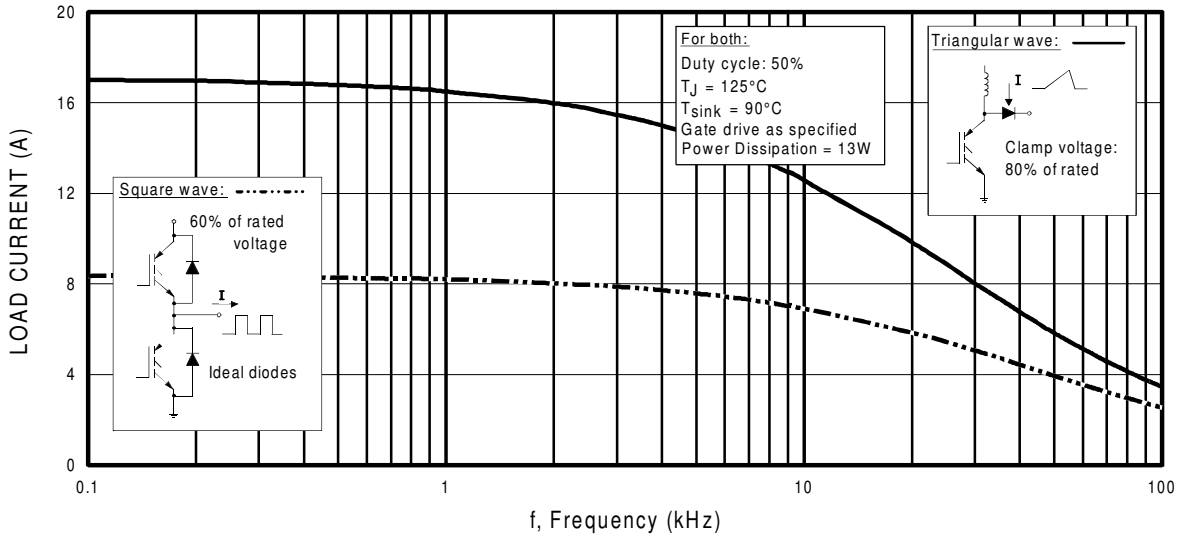


Fig. 1 - Typical Load Current vs. Frequency
 (For square wave, $I = I_{RMS}$ of fundamental; for triangular wave, $I = I_{PK}$)

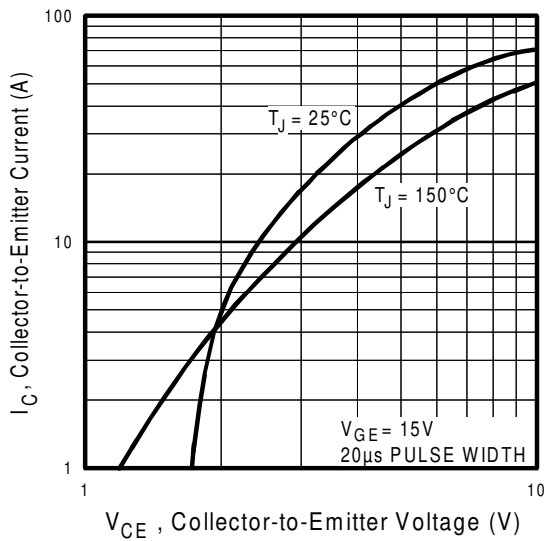


Fig. 2 - Typical Output Characteristics

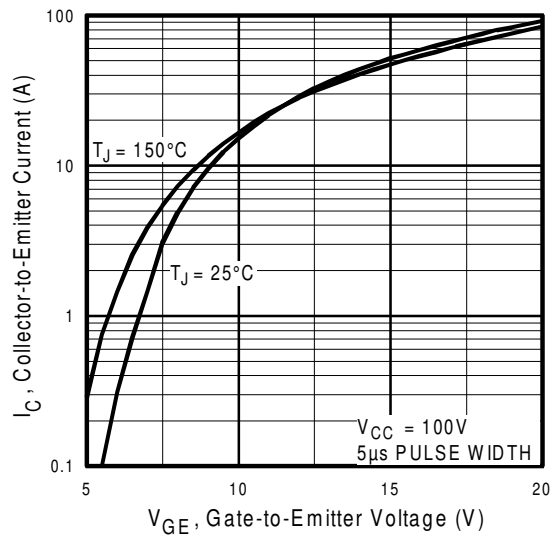


Fig. 3 - Typical Transfer Characteristics

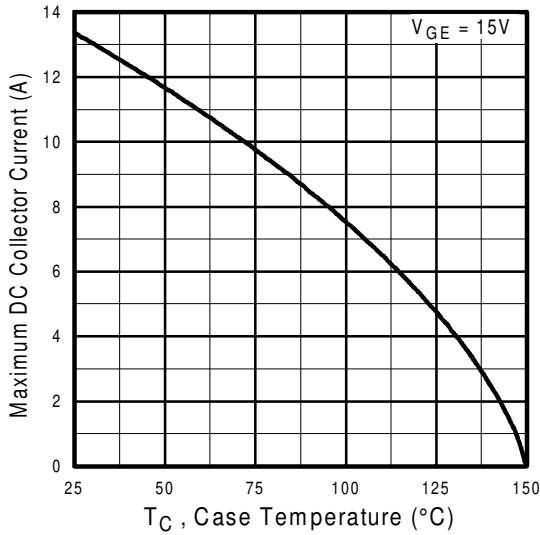


Fig. 4 - Maximum Collector Current vs. Case Temperature

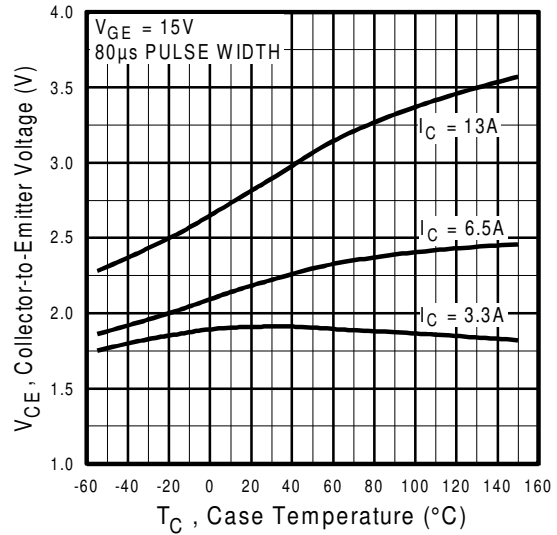


Fig. 5 - Collector-to-Emitter Voltage vs. Case Temperature

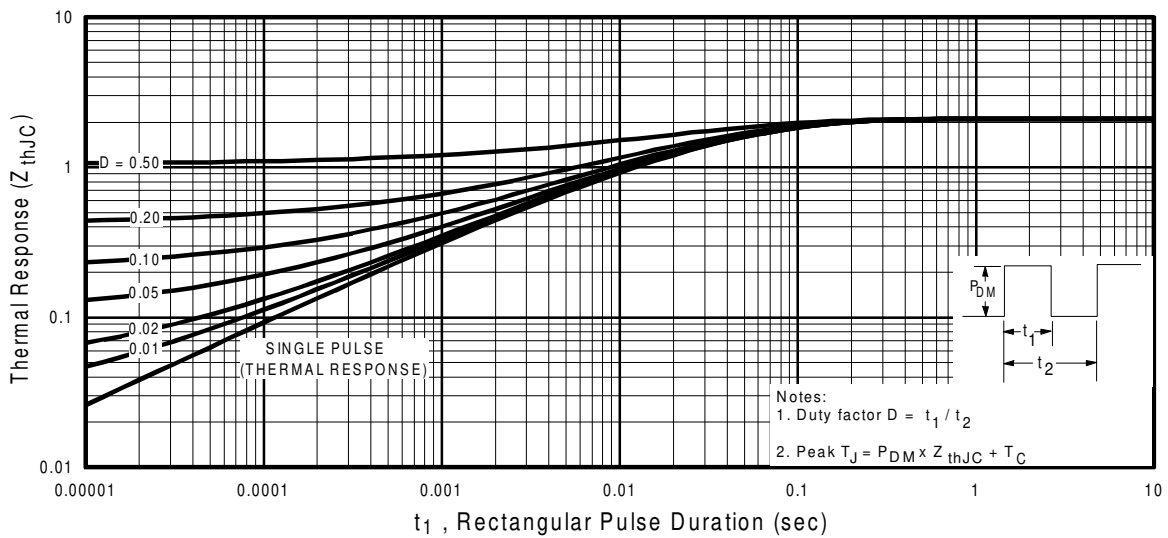


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

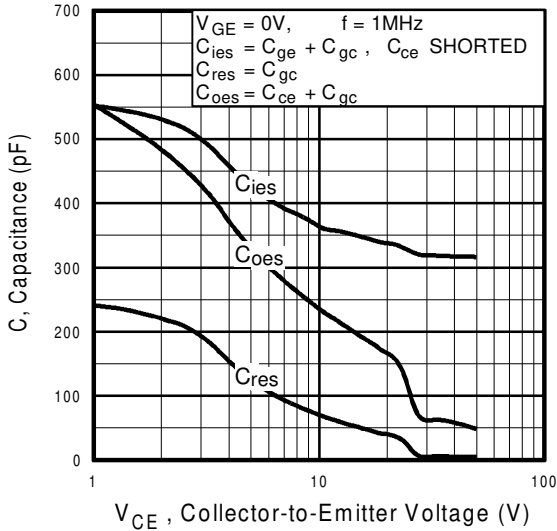


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

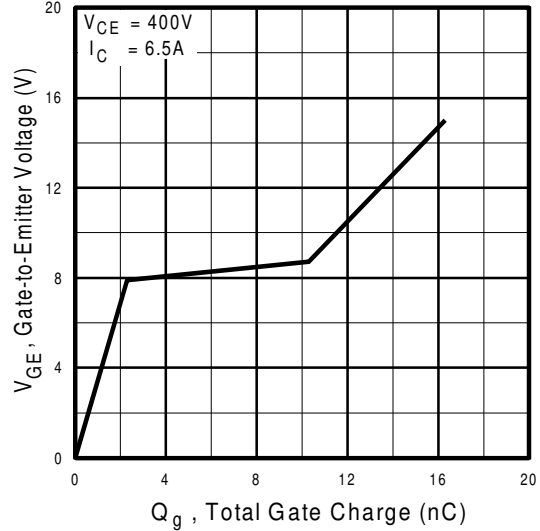


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

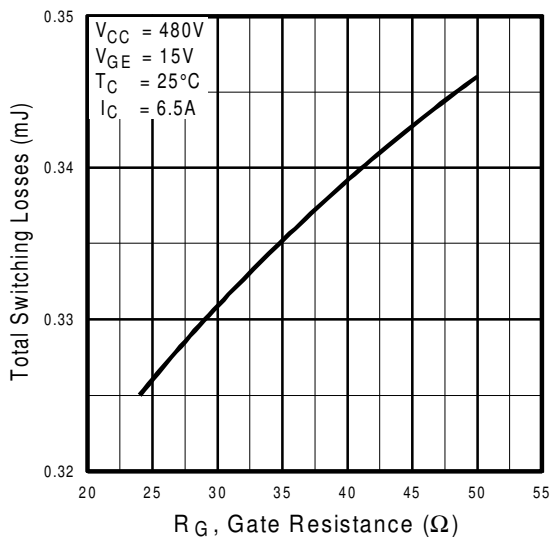


Fig. 9 - Typical Switching Losses vs. Gate Resistance

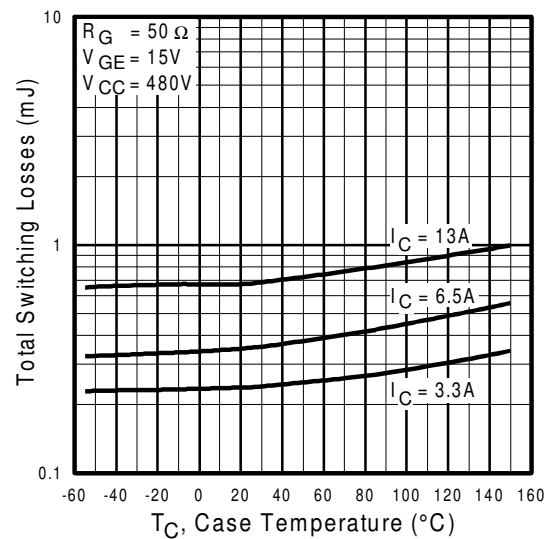


Fig. 10 - Typical Switching Losses vs. Case Temperature

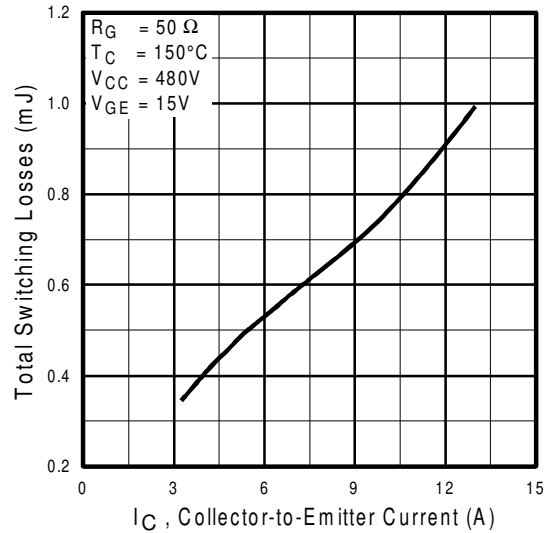


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

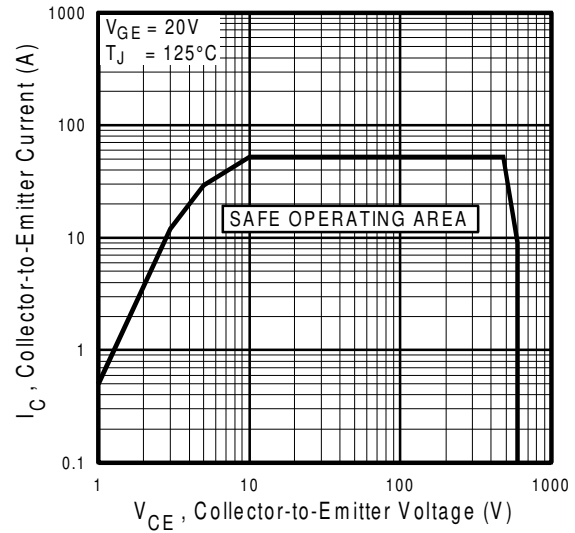


Fig. 12 - Turn-Off SOA

Refer to Section D for the following:

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- Fig. 13a - Clamped Inductive Load Test Circuit
- Fig. 13b - Pulsed Collector Current Test Circuit
- Fig. 14a - Switching Loss Test Circuit
- Fig. 14b - Switching Loss Waveform

Package Outline 1 - JEDEC Outline TO-220AB

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