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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.

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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



IRGBC30FD2

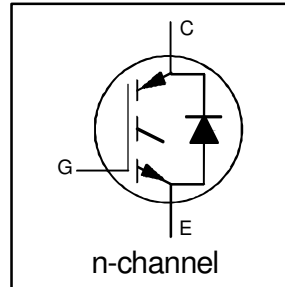
INSULATED GATE BIPOLAR TRANSISTOR
WITH ULTRAFAST SOFT RECOVERY

Fast CoPack IGBT

DIODE

Features

- Switching-loss rating includes all "tail" losses
- HEXFRED™ soft ultrafast diodes
- Optimized for medium operating frequency (1 to 10kHz) See Fig. 1 for Current vs. Frequency curve



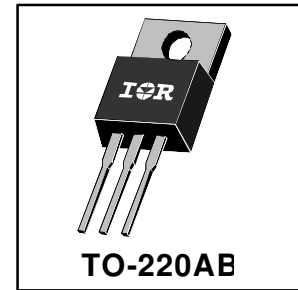
$V_{CES} = 600V$

$V_{CE(sat)} \leq 2.1V$

@ $V_{GE} = 15V, I_C = 31A$

Description

Co-packaged IGBTs are a natural extension of International Rectifier's well known IGBT line. They provide the convenience of an IGBT and an ultrafast recovery diode in one package, resulting in substantial benefits to a host of high-voltage, high-current, motor control, UPS and power supply 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	31	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	17	
I_{CM}	Pulsed Collector Current ①	120	
I_{LM}	Clamped Inductive Load Current ②	120	
$I_F @ T_C = 100^\circ C$	Diode Continuous Forward Current	12	
I_{FM}	Diode Maximum Forward Current	120	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	100	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	42	
T_J	Operating Junction and Storage Temperature Range	-55 to +150	°C
T_{STG}		Soldering Temperature, for 10 sec.	
	Mounting Torque, 6-32 or M3 Screw.	10 lbf•in (1.1 N•m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case - IGBT	—	—	1.2	°C/W
$R_{\theta JC}$	Junction-to-Case - Diode	—	—	2.5	
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	—	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	—	80	
Wt	Weight	—	2 (0.07)	—	g (oz)

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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 ③	600	—	—	V	$V_{GE} = 0V, I_C = 250\mu A$
$\Delta V_{(BR)CES}/\Delta T_J$	Temp. Coeff. of Breakdown Voltage	—	0.69	—	V/°C	$V_{GE} = 0V, I_C = 1.0mA$
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.8	2.1	V	$I_C = 17A$ $V_{GE} = 15V$ See Fig. 2, 5
		—	2.4	—		
		—	2.2	—		
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	5.5		$V_{CE} = V_{GE}, I_C = 250\mu A$
$\Delta V_{GE(th)}/\Delta T_J$	Temp. Coeff. of Threshold Voltage	—	-11	—	mV/°C	$V_{CE} = V_{GE}, I_C = 250\mu A$
g_{fe}	Forward Transconductance ④	6.1	10	—	S	$V_{CE} = 100V, I_C = 17A$
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	$V_{GE} = 0V, V_{CE} = 600V$ $V_{GE} = 0V, V_{CE} = 600V, T_J = 150^\circ C$
		—	—	2500		
V_{FM}	Diode Forward Voltage Drop	—	1.4	1.7	V	$I_C = 12A$ $I_C = 12A, T_J = 150^\circ C$ See Fig. 13
		—	1.3	1.6		
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)	—	27	30	nC	$I_C = 17A$ $V_{CC} = 400V$ See Fig. 8
Q_{ge}	Gate - Emitter Charge (turn-on)	—	4.1	5.9		
Q_{gc}	Gate - Collector Charge (turn-on)	—	12	15		
$t_{d(on)}$	Turn-On Delay Time	—	72	—	ns	$T_J = 25^\circ C$ $I_C = 17A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 23\Omega$ Energy losses include "tail" and diode reverse recovery. See Fig. 9, 10, 11, 18
t_r	Rise Time	—	75	—		
$t_{d(off)}$	Turn-Off Delay Time	—	300	450		
t_f	Fall Time	—	220	350		
E_{on}	Turn-On Switching Loss	—	0.9	—	mJ	See Fig. 9, 10, 11, 18
E_{off}	Turn-Off Switching Loss	—	2.1	—		
E_{ts}	Total Switching Loss	—	3.0	4.6		
$t_{d(on)}$	Turn-On Delay Time	—	70	—	ns	$T_J = 150^\circ C$, See Fig. 9, 10, 11, 18 $I_C = 17A, V_{CC} = 480V$ $V_{GE} = 15V, R_G = 23\Omega$ Energy losses include "tail" and diode reverse recovery.
t_r	Rise Time	—	75	—		
$t_{d(off)}$	Turn-Off Delay Time	—	420	—		
t_f	Fall Time	—	480	—		
E_{ts}	Total Switching Loss	—	4.7	—	mJ	
L_E	Internal Emitter Inductance	—	7.5	—	nH	Measured 5mm from package
C_{ies}	Input Capacitance	—	660	—	pF	$V_{GE} = 0V$ $V_{CC} = 30V$ $f = 1.0MHz$ See Fig. 7
C_{oes}	Output Capacitance	—	100	—		
C_{res}	Reverse Transfer Capacitance	—	10	—		
t_{rr}	Diode Reverse Recovery Time	—	42	60	ns	$T_J = 25^\circ C$ See Fig. 14 $T_J = 125^\circ C$
		—	80	120		
I_{rr}	Diode Peak Reverse Recovery Current	—	3.5	6.0	A	$T_J = 25^\circ C$ See Fig. 15 $T_J = 125^\circ C$
		—	5.6	10		
Q_{rr}	Diode Reverse Recovery Charge	—	80	180	nC	$T_J = 25^\circ C$ See Fig. 16 $T_J = 125^\circ C$
		—	220	600		
$di_{(rec)M}/dt$	Diode Peak Rate of Fall of Recovery During t_b	—	180	—	A/ μs	$T_J = 25^\circ C$ See Fig. 17 $T_J = 125^\circ C$
		—	120	—		

Notes:

① Repetitive rating; $V_{GE}=20V$, pulse width limited by max. junction temperature. (See fig. 20)

② $V_{CC}=80\%(V_{CES}), V_{GE}=20V, L=10\mu H, R_G=23\Omega,$ (See fig. 19)

③ Pulse width $\leq 80\mu s$; duty factor $\leq 0.1\%$.

④ Pulse width 5.0 μs , single shot.

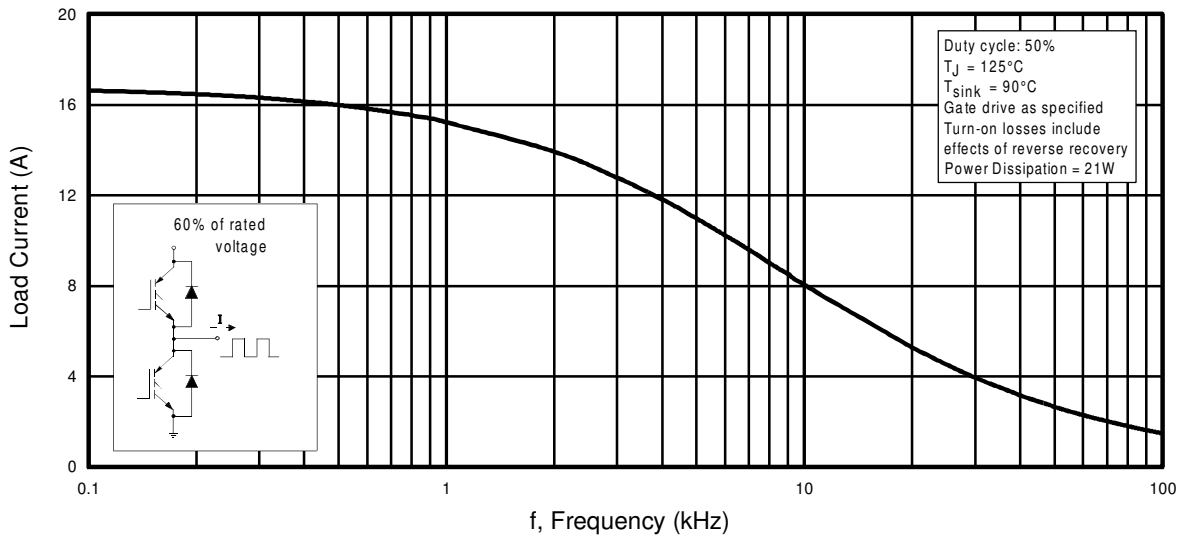


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

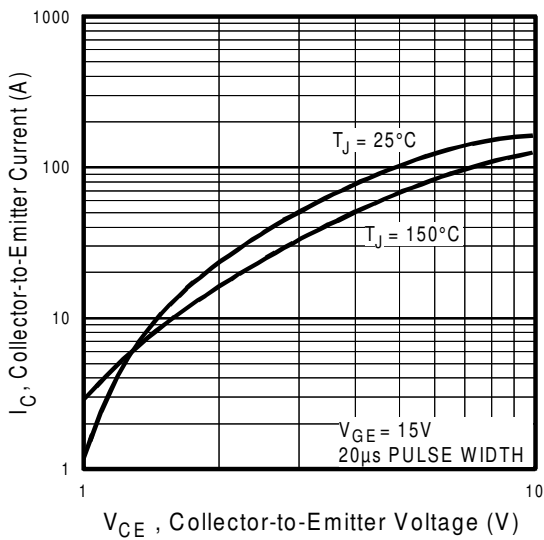


Fig. 2 - Typical Output Characteristics

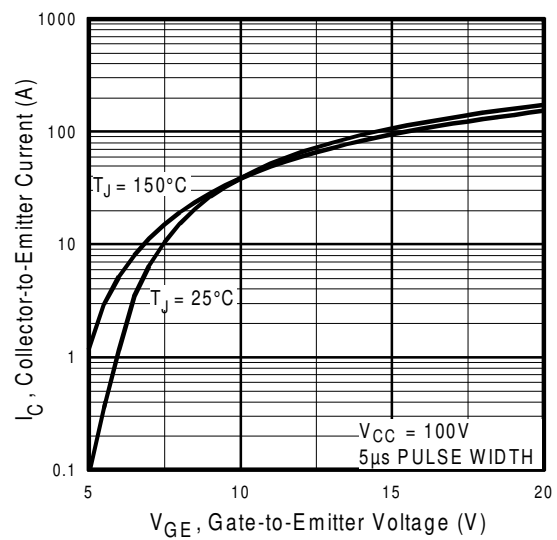


Fig. 3 - Typical Transfer Characteristics

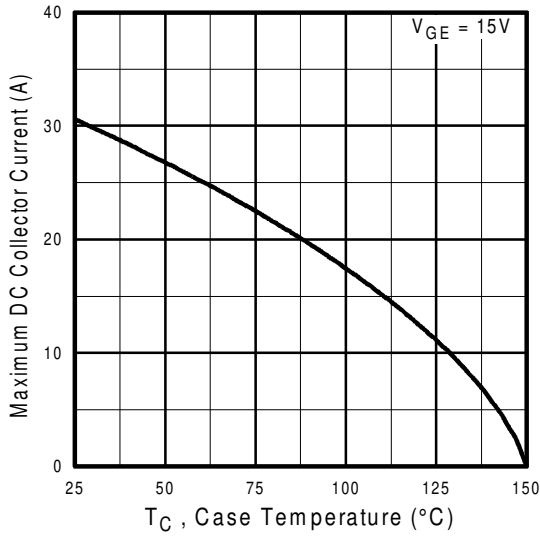


Fig. 4 - Maximum Collector Current vs. Case Temperature

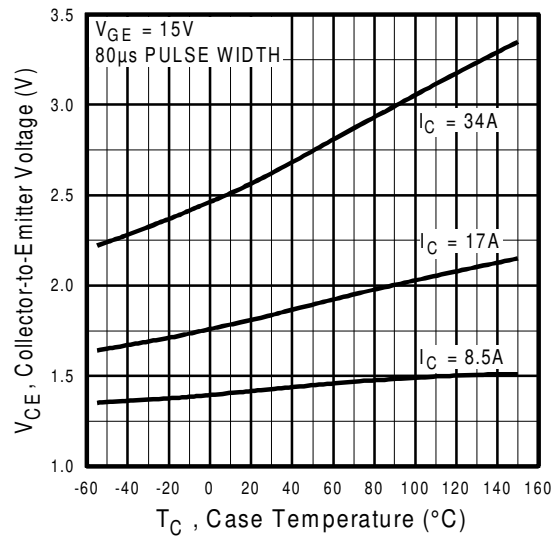


Fig. 5 - Collector-to-Emitter Voltage vs. Case Temperature

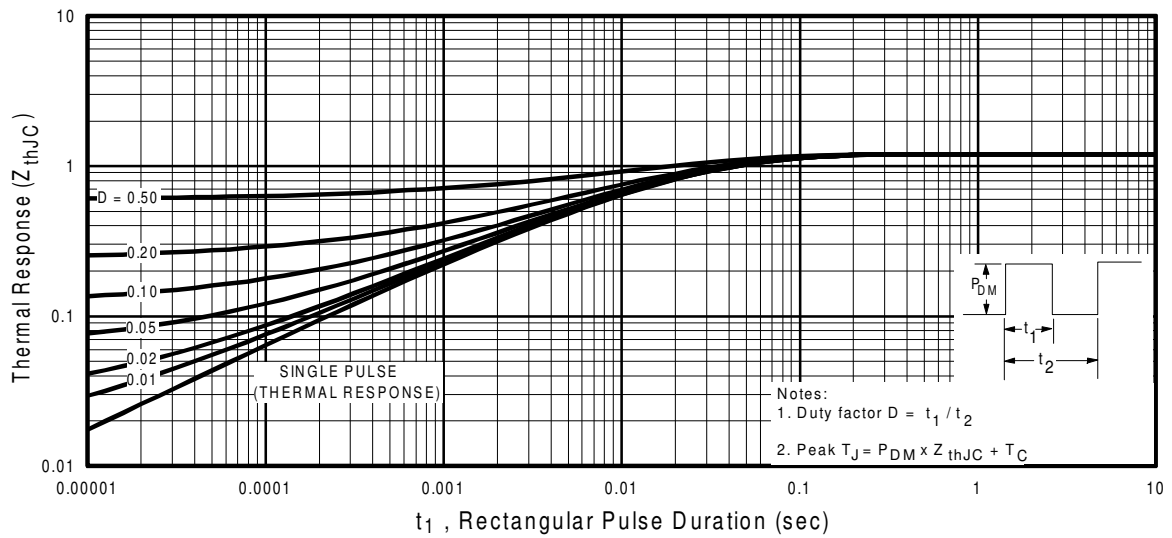


Fig. 6 - Maximum IGBT Effective Transient Thermal Impedance, Junction-to-Case

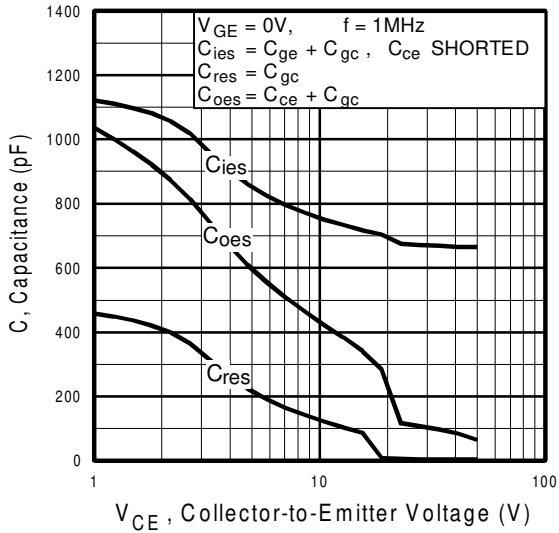


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

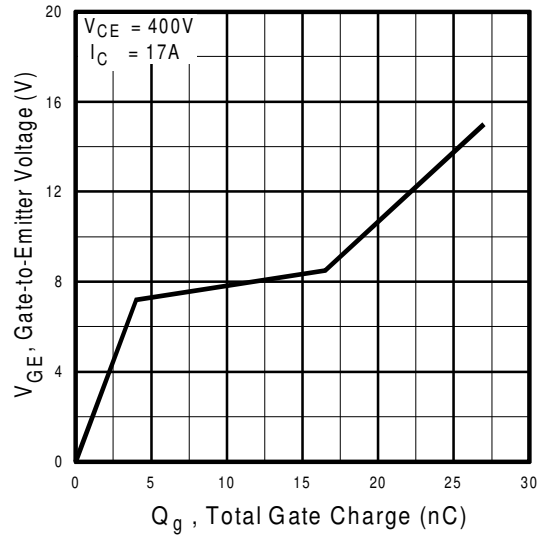


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

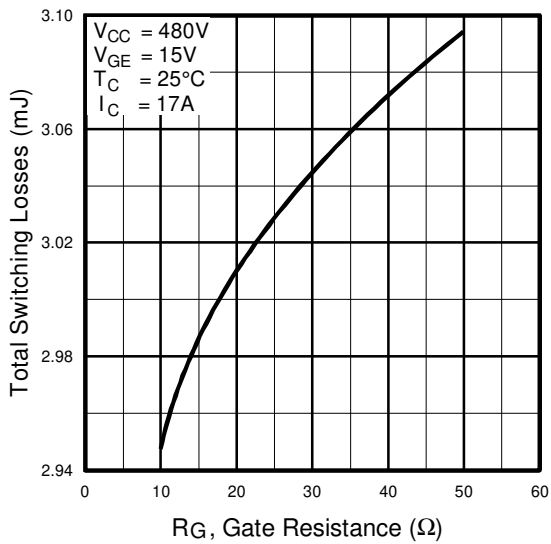


Fig. 9 - Typical Switching Losses vs. Gate Resistance

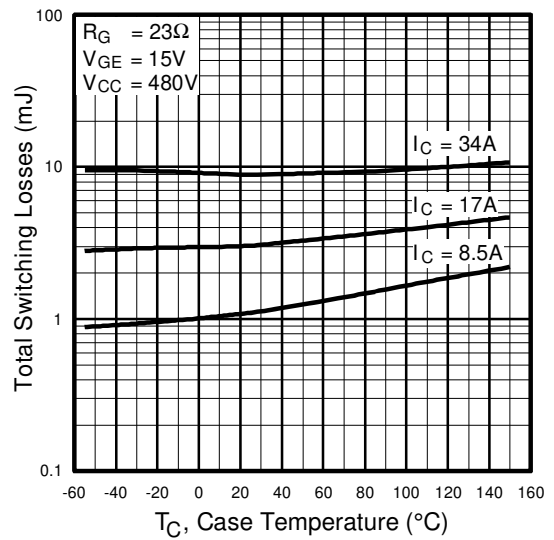


Fig. 10 - Typical Switching Losses vs. Case Temperature

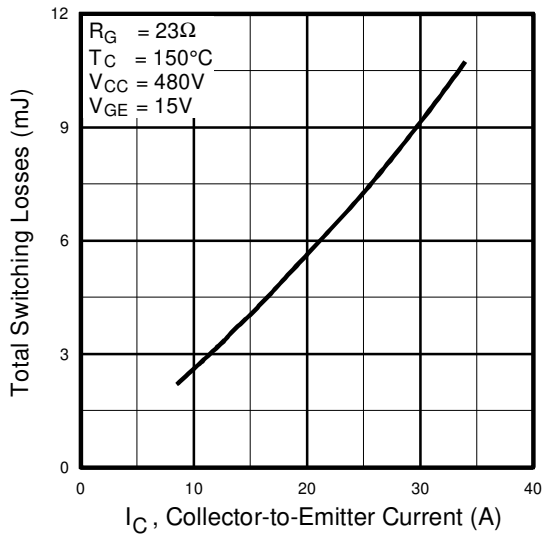


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

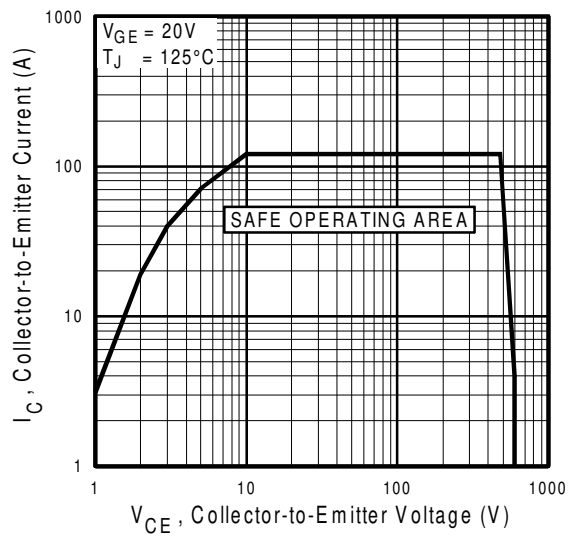


Fig. 12 - Turn-Off SOA

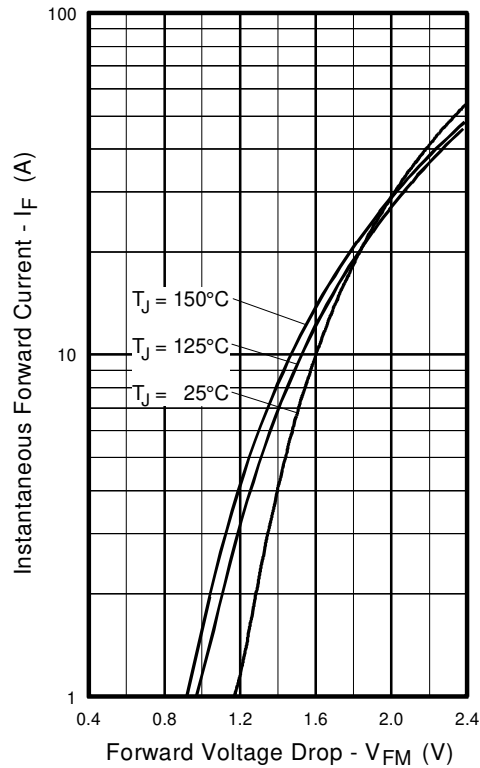


Fig. 13 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

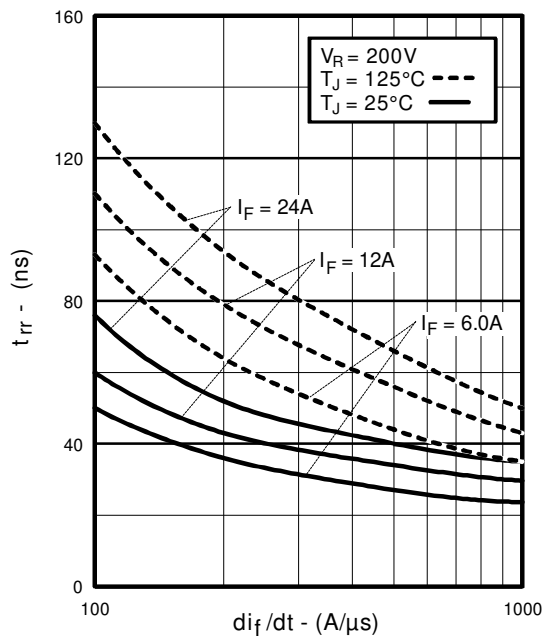


Fig. 14 - Typical Reverse Recovery vs. di/dt

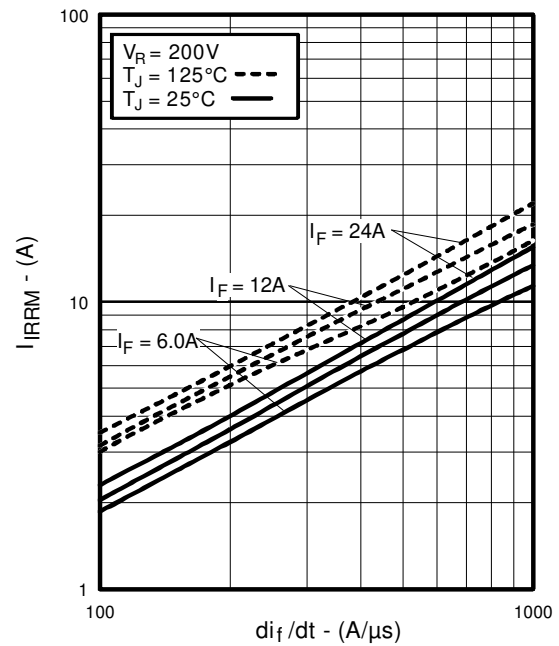


Fig. 15 - Typical Recovery Current vs. di/dt

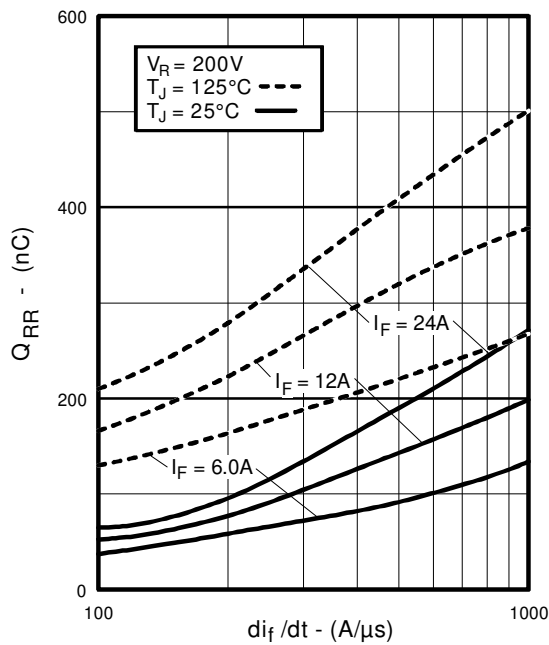


Fig. 16 - Typical Stored Charge vs. di/dt

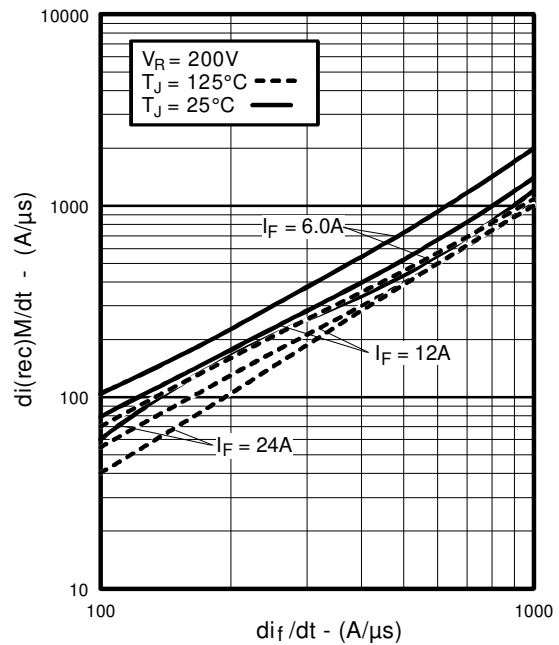


Fig. 17 - Typical $di_{(rec)M}/dt$ vs. di/dt

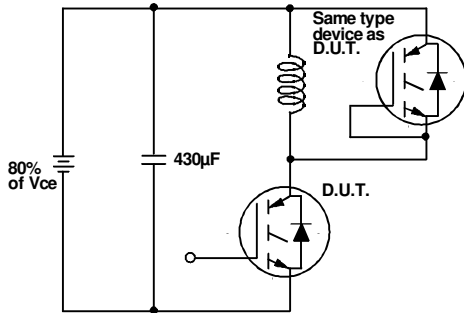


Fig. 18a - Test Circuit for Measurement of I_{LM} , E_{on} , $E_{off}(\text{diode})$, t_{rr} , Q_{rr} , I_{rr} , $t_{d(on)}$, t_r , $t_{d(off)}$, t_f

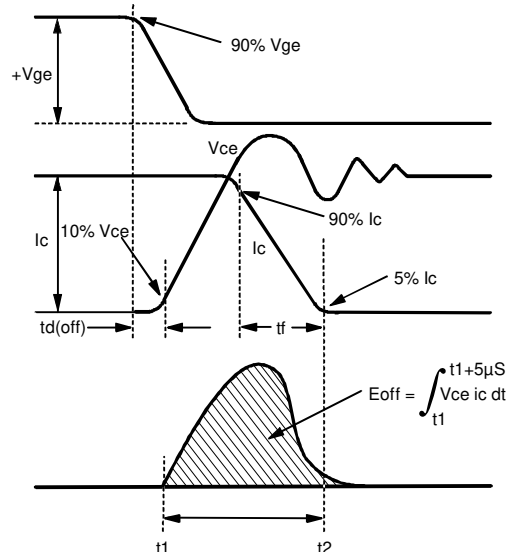


Fig. 18b - Test Waveforms for Circuit of Fig. 18a, Defining E_{off} , $t_{d(off)}$, t_f

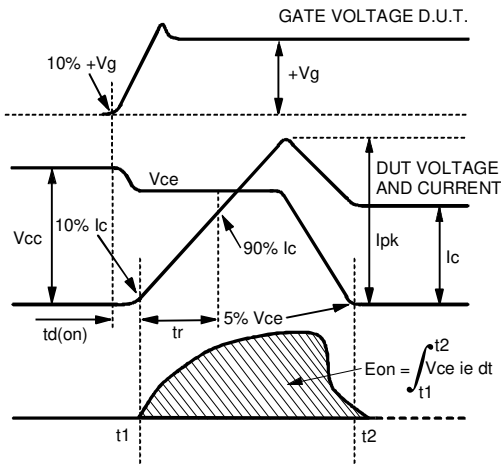


Fig. 18c - Test Waveforms for Circuit of Fig. 18a, Defining E_{on} , $t_{d(on)}$, t_r

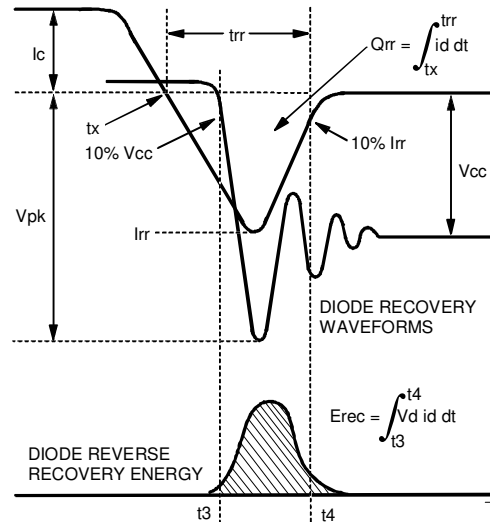


Fig. 18d - Test Waveforms for Circuit of Fig. 18a, Defining E_{rec} , t_{tr} , Q_{rr} , I_{rr}

**Refer to Section D for the following:
Appendix D: Section D - page D-6**

- Fig. 18e - Macro Waveforms for Test Circuit of Fig. 18a
- Fig. 19 - Clamped Inductive Load Test Circuit
- Fig. 20 - Pulsed Collector Current Test Circuit