

IRGPH30MD2

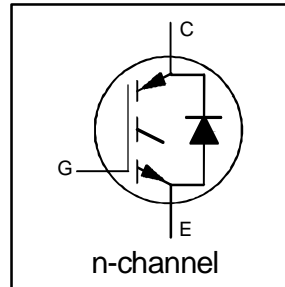
INSULATED GATE BIPOLAR TRANSISTOR
WITH ULTRAFAST SOFT RECOVERY

Short Circuit Rated
Fast CoPack IGBT

DIODE

Features

- Short circuit rated $-10\mu\text{s}$ @ 125°C , $V_{GE} = 15\text{V}$
- Switching-loss rating includes all "tail" losses
- HEXFRED™ soft ultrafast diodes
- Optimized for medium operating frequency (1 to 10kHz)



$$V_{CES} = 1200\text{V}$$

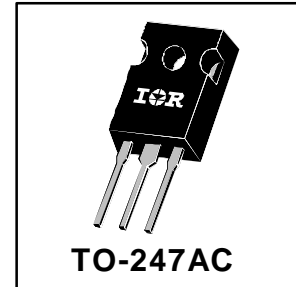
$$V_{CE(sat)} \leq 3.5\text{V}$$

@ $V_{GE} = 15\text{V}$, $I_C = 9.0\text{A}$

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, applications.

These new short circuit rated devices are especially suited for motor control and other applications requiring short circuit withstand capability.



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	1200	V
$I_C @ T_C = 25^\circ\text{C}$	Continuous Collector Current	15	A
$I_C @ T_C = 100^\circ\text{C}$	Continuous Collector Current	9.0	
I_{CM}	Pulsed Collector Current ①	30	
I_{LM}	Clamped Inductive Load Current ②	30	
$I_F @ T_C = 100^\circ\text{C}$	Diode Continuous Forward Current	6.0	
I_{FM}	Diode Maximum Forward Current	30	
t_{sc}	Short Circuit Withstand Time	10	μs
V_{GE}	Gate-to-Emitter Voltage	± 20	V
$P_D @ T_C = 25^\circ\text{C}$	Maximum Power Dissipation	100	W
$P_D @ T_C = 100^\circ\text{C}$	Maximum Power Dissipation	42	
T_J	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_{STG}			
	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	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-to-Case - Diode	—	—	2.5	
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	—	40	
Wt	Weight	—	6 (0.21)	—	g (oz)

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Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)CES}	Collector-to-Emitter Breakdown Voltage ③	1200	—	—	V	V _{GE} = 0V, I _C = 250μA
ΔV _{(BR)CES/ΔT_J}	Temperature Coeff. of Breakdown Voltage	—	—	—	V/°C	V _{GE} = 0V, I _C = 1.0mA
V _{CE(on)}	Collector-to-Emitter Saturation Voltage	—	3.1	3.5	V	I _C = 9.0A V _{GE} = 15V
		—	4.9	—		I _C = 15A
		—	3.6	—		I _C = 9.0A, T _J = 150°C
V _{GE(th)}	Gate Threshold Voltage	3.0	—	5.5		V _{CE} = V _{GE} , I _C = 250μA
ΔV _{GE(th)/ΔT_J}	Temperature Coeff. of Threshold Voltage	—	-14	—	mV/°C	V _{CE} = V _{GE} , I _C = 250μA
g _{fe}	Forward Transconductance ④	2.5	—	—	S	V _{CE} = 100V, I _C = 9.0A
I _{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	V _{GE} = 0V, V _{CE} = 1200V
		—	—	2500		V _{GE} = 0V, V _{CE} = 1200V, T _J = 150°C
V _{FM}	Diode Forward Voltage Drop	—	2.7	3.0	V	I _C = 6.0A
		—	2.4	2.7		I _C = 6.0A, T _J = 150°C
I _{GES}	Gate-to-Emitter Leakage Current	—	—	±100	nA	V _{GE} = ±20V

Switching Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions	
Q _g	Total Gate Charge (turn-on)	—	25	30	nC	I _C = 9.0A	
Q _{ge}	Gate - Emitter Charge (turn-on)	—	—	6.0		V _{CC} = 960V	
Q _{gc}	Gate - Collector Charge (turn-on)	—	—	15			
t _{d(on)}	Turn-On Delay Time	—	2.3	—	ns	T _J = 25°C	
t _r	Rise Time	—	10	—		I _C = 9.0A, V _{CC} = 960V	
t _{d(off)}	Turn-Off Delay Time	—	200	450		V _{GE} = 15V, R _G = 23Ω	
t _f	Fall Time	—	210	390		Energy losses include "tail" and diode reverse recovery.	
E _{on}	Turn-On Switching Loss	—	—	—		mJ	
E _{off}	Turn-Off Switching Loss	—	—	—			
E _{ts}	Total Switching Loss	—	4.0	7.0			
t _{sc}	Short Circuit Withstand Time	10	—	—		μs	V _{CC} = 720V, T _J = 125°C V _{GE} = 15V, R _G = 23Ω, V _{CPK} < 1000V
t _{d(on)}	Turn-On Delay Time	—	33	—		ns	T _J = 150°C,
t _r	Rise Time	—	20	—			I _C = 9.0A, V _{CC} = 960V
t _{d(off)}	Turn-Off Delay Time	—	480	—	V _{GE} = 15V, R _G = 23Ω		
t _f	Fall Time	—	450	—	Energy losses include "tail" and diode reverse recovery.		
E _{ts}	Total Switching Loss	—	8.0	—	mJ		
L _E	Internal Emitter Inductance	—	13	—	nH	Measured 5mm from package	
C _{ies}	Input Capacitance	—	670	—	pF	V _{GE} = 0V	
C _{oes}	Output Capacitance	—	50	—		V _{CC} = 30V	
C _{res}	Reverse Transfer Capacitance	—	10	—		f = 1.0MHz	
t _{rr}	Diode Reverse Recovery Time	—	53	80	ns	T _J = 25°C	
		—	87	130		T _J = 125°C	
I _{rr}	Diode Peak Reverse Recovery Current	—	4.4	8.0	A	T _J = 25°C	
		—	5.0	9.0		T _J = 125°C	
Q _{rr}	Diode Reverse Recovery Charge	—	116	320	nC	T _J = 25°C	
		—	233	585		T _J = 125°C	
di _{(rec)M/dt}	Diode Peak Rate of Fall of Recovery During t _b	—	180	—	A/μs	T _J = 25°C	
		—	100	—		T _J = 125°C	

Notes: ① Repetitive rating; V_{GE}=20V, pulse width limited by max. junction temperature.

② V_{CC}=80%(V_{CES}), V_{GE}=20V, L=10μH, R_G=23Ω

④ Pulse width 5.0μs, single shot.

③ Pulse width ≤ 80μs; duty factor ≤ 0.1%.

Refer to Section D - page D-13 for Package Outline 3 - JEDEC Outline TO-247AC