

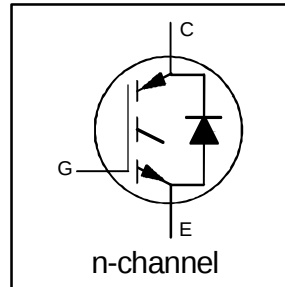
IRGPH30MD2

INSULATED GATE BIPOLAR TRANSISTOR
WITH ULTRAFAST SOFT RECOVERY

Short Circuit Rated
Fast CoPack IGBT

DIODE Features

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

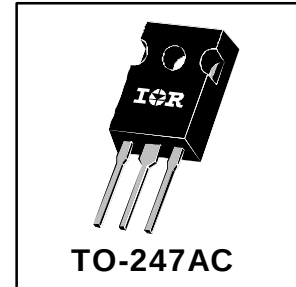


$V_{CES} = 1200V$
 $V_{CE(sat)} \leq 3.5V$
@ $V_{GE} = 15V$, $I_C = 9.0A$

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
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	15	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	9.0	
I_{CM}	Pulsed Collector Current ①	30	
I_{LM}	Clamped Inductive Load Current ②	30	
$I_F @ T_C = 100^\circ C$	Diode Continuous Forward Current	6.0	
I_{FM}	Diode Maximum Forward Current	30	μs
t_{sc}	Short Circuit Withstand Time	10	
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	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range		
	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	$^\circ C/W$
$R_{\theta JC}$	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)

IRGPH30MD2



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	1200	—	—	V	$V_{GE} = 0V, I_C = 250\mu A$
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	—	—	V/ $^\circ\text{C}$	$V_{GE} = 0V, I_C = 1.0mA$
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	3.1	3.5	V	$I_C = 9.0A, V_{GE} = 15V$
		—	4.9	—		$I_C = 15A$
		—	3.6	—		$I_C = 9.0A, T_J = 150^\circ\text{C}$
$V_{GE(th)}$	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	—	-14	—	mV/ $^\circ\text{C}$	$V_{CE} = V_{GE}, I_C = 250\mu A$
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		$V_{GE} = 0V, V_{CE} = 1200V, T_J = 150^\circ\text{C}$
V_{FM}	Diode Forward Voltage Drop	—	2.7	3.0	V	$I_C = 6.0A$
		—	2.4	2.7		$I_C = 6.0A, T_J = 150^\circ\text{C}$
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)	—	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	$T_J = 25^\circ\text{C}$
t_r	Rise Time	—	10	—		$I_C = 9.0A, V_{CC} = 960V$
$t_{d(off)}$	Turn-Off Delay Time	—	200	450		$V_{GE} = 15V, R_G = 23\Omega$
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	$V_{CC} = 720V, T_J = 125^\circ\text{C}$ $V_{GE} = 15V, R_G = 23\Omega, V_{CPK} < 1000V$
$t_{d(on)}$	Turn-On Delay Time	—	33	—	ns	$T_J = 150^\circ\text{C}$
t_r	Rise Time	—	20	—		$I_C = 9.0A, V_{CC} = 960V$
$t_{d(off)}$	Turn-Off Delay Time	—	480	—		$V_{GE} = 15V, R_G = 23\Omega$
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	$T_J = 25^\circ\text{C}$
		—	87	130		$T_J = 125^\circ\text{C}$
I_{rr}	Diode Peak Reverse Recovery Current	—	4.4	8.0	A	$T_J = 25^\circ\text{C}$
		—	5.0	9.0		$T_J = 125^\circ\text{C}$
Q_{rr}	Diode Reverse Recovery Charge	—	116	320	nC	$T_J = 25^\circ\text{C}$
		—	233	585		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt$	Diode Peak Rate of Fall of Recovery During t_b	—	180	—	A/ μs	$T_J = 25^\circ\text{C}$
		—	100	—		$T_J = 125^\circ\text{C}$

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

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

④ Pulse width 5.0 μs , single shot.

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

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