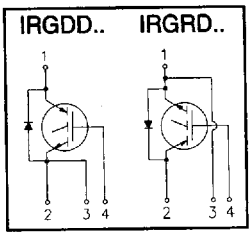
International
IOR Rectifier

IRGDDN400M12
IRGRDN400M12

"SINGLE SWITCH" IGBT DOUBLE INT-A-PAK — Low conduction loss IGBT

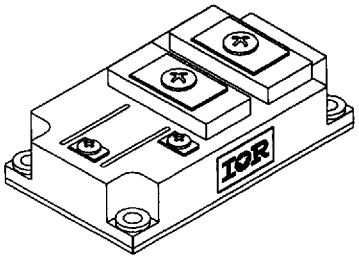


V_{CE} = 1200V
I_C = 400A
$V_{CE}(ON) < 2.5V$
$t_{sc} > 10\mu s$

- Rugged Design
- Simple gate-drive
- Switching-Loss Rating includes all "tail" losses
- Short circuit rated

Description

IR's advanced IGBT technology is the key to this line of DOUBLE 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. This superior technology has now been coupled to state of the art assembly techniques to produce a higher current module that is highly suited to power applications such as motor drives, uninterruptible power supplies, welding and power factor correction.



DOUBLE INT-A-PAK case

Absolute Maximum Ratings

Parameter	Description	Value	Units
V_{CES}	Continuous collector to emitter voltage	1200	V
I_C @ T_C=25°C	Maximum continuous collector current	400	A
R_{thJC}	Thermal resistance junction to case	0.045	°C/W
E_{ts} @ T_J=125°C	Total switching energy, R_G=4.7Ω, V_{CC}=600V, I_C=400A	0.55	mJ/A
I_{LM}	Peak switching current	800	A
I_{FM}	Peak diode forward current (1)	800	
V_{GE}	Gate to emitter voltage	±20	V
V_{ISOL}	RMS isolation voltage, any terminal to case, t = 1 min	2500	
P_D @ T_C = 25°C	Power dissipation	2770	W
T_J	Operating junction temperature range	-40 to 150	°C
T_{STG}	Storage temperature range	-40 to 125	

(1) Duration limited by max junction temperature.

Target Data

Electrical Characteristics - T_J = 25°C, unless otherwise stated

Parameter	Description	Min	Typ	Max	Units	Test Conditions
BV_{CES}	Collector-to-emitter breakdown voltage	1200	—	—	V	V_{GE} = 0V, I_C = 12mA
V_{CE}(ON)	Collector-to-emitter voltage	—	2.3	2.7		V_{GE} = 15V, I_C = 400A
		—	1.8	—		V_{GE} = 15V, I_C = 300A, T_J = 150°C
V_{FM}	Diode forward voltage - maximum	—	3.2	3.4		I_F = 400A, V_{GE} = 0V
		—	2.6	—		I_F = 400A, V_{GE} = 0V, T_J = 150°C
V_{GEth}	Gate threshold voltage	3.0	—	5.5		I_C = 4mA
ΔV_{GEth}	Threshold voltage temperature coefficient	—	-11	—	mV/°C	V_{CE} = V_{GE}, I_C = 4mA
g_{fe}	Forward transconductance	140	—	280	S(℧)	V_{CE} = 25V, I_C = 400A
I_{CES}	Collector-to-emitter leakage current	—	—	12	mA	V_{GE} = 0V, V_{CE} = 1200V
		—	—	120		V_{GE}=0V, V_{CE}=1200V, T_J=150°C
I_{GES}	Gate-to-emitter leakage current	—	—	±12	μA	V_{GE} = ±20V

Dynamic Characteristics - T_J = 125°C

Parameter	Description	Min	Typ	Max	Units	Test Conditions
E_{on}	Turn-on switching energy	—	0.19	—	mJ/A	R_G = 15Ω, V_{CC} = 600V
E_{off} (1)	Turn-off switching energy	---	0.34	---		I_C = 400A, L_s = 100nH
E_{ts} (1)	Total switching energy	—	—	0.60		V_{GE} = ±15V
$t_{d(on)}$	Turn-on delay time	—	400	550	ns	R_G = 15Ω, V_{CC} = 600V
t_r	Rise time	—	600	800		I_C = 400A
$t_{d(off)}$	Turn-off delay time	—	550	650		V_{GE} = ±15V
t_f	Fall time	—	650	—		Resistive Load, T_J = 25°C
I_{rr}	Diode peak recovery current	—	130	—	A	R_G = 15Ω, V_{CC} = 600V
t_{rr}	Diode recovery time	—	220	—	ns	I_C = 400A
Q_{rr}	Diode recovery charge	—	16.5	—	μC	V_{GE} = ±15V
Q_{ge}	Gate-to-emitter charge (turn-on)	440	—	1000	nC	V_{CC} = 600V
Q_{gc}	Gate-to-collector charge (turn-on)	600	—	1900		I_C = 400A
Q_g	Total gate charge (turn-on)	3700	—	4500		V_{GE} = 15V
C_{ies}	Input capacitance	63000	—	66000	pF	V_{GE} = 0V
C_{oes}	Output capacitance	3900	—	6600		V_{CC} = 30V
C_{res}	Reverse transfer capacitance	3900	—	6600		f = 1MHz
t_{SC}	Short circuit withstand time	10	—	—	μs	V_{CC} = 720V, V_{GE} = ±15V Min. R_G = 15Ω, 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	—	0.047	°C/W
R_{thJC} (Diode)	Thermal resistance, junction to case, each diode	—	0.052	
R_{thCS} (Module)	Thermal resistance, case to sink	0.023	0.050	
Wt	Weight of module	242	—	g

Refer to Section D - page D-18 for Package Outline 13 - Double INT-A-PAK Single Switch