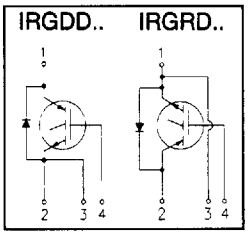
International
IOR Rectifier

Provisional Data Sheet PD-9.1196

IRGDDN400K06
IRGRDN400K06

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

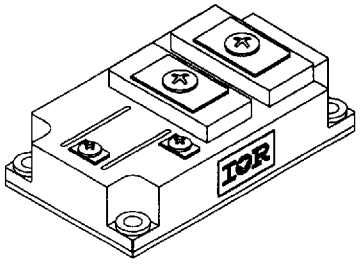


V_{CE} = 600V
I_C = 400A
$V_{CE}(ON) < 2.7V$
$t_{sc} > 10\mu s$

- 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	600	V
I_C @ T_C = 25°C	Maximum Continuous collector current	520	A
I_C @ T_C = 85°C	Maximum Continuous collector current	280	
I_C @ T_C = 100°C	Maximum Continuous collector current	200	
I_{LM}	Peak switching current	800	
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	1984	
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	600	—	—	V	V_{GE} = 0V, I_C = 6mA
$V_{CE}(ON)$	Collector-to-emitter voltage	—	—	2.7		V_{GE} = 15V, I_C = 400A
		—	2.7	—		V_{GE} = 15V, I_C = 400A, T_J = 125°C
V_{FM}	Diode forward voltage - maximum	—	1.8	2.0		I_F = 400A, V_{GE} = 0V
		—	1.8	—		I_F = 400A, V_{GE} = 0V, T_J = 125°C
V_{GEth}	Gate threshold voltage	3.0	—	5.5		I_C = 3mA
DV_{GEth}	Threshold voltage temperature coefficient	—	- 11	—	mV/°C	V_{CE} = V_{GE}, I_C = 3mA
g_{fe}	Forward transconductance	204	—	348	S(℧)	V_{CE} = 25V, I_C = 300A
I_{CES}	Collector-to-emitter leakage current	—	—	6	mA	V_{GE} = 0V, V_{CE} = 600V
		—	—	60		V_{GE}= 0V, V_{CE}= 600V, T_J =125°C
I_{GES}	Gate-to-emitter leakage current	—	—	± 6	µA	V_{GE} = ± 20V

Dynamic Characteristics - T_J = 125°C

Parameter	Description	Min	Typ	Max	Units	Test Conditions
E_{on}	Turn-on switching energy	—	0.04	—	mJ/A	R_G =15Ω, V_{CC} = 300 V
E_{off} (1)	Turn-off switching energy	—	0.06	—		I_C = 400A, L_S = 100nH
E_{ts} (1)	Total switching energy	—	—	0.15		V_{GE} = ± 15V
$t_{d(on)}$	Turn-on delay time	—	300	—	ns	R_G = 15Ω, V_{CC} = 300V
t_r	Rise time	—	900	—		I_C = 400A
$t_{d(off)}$	Turn-off delay time	—	700	—		V_{GE} = ± 15V
t_f	Fall time	—	120	—		Resistive Load, T_J = 25°C
I_{rr}	Diode peak recovery current	—	110	—	A	R_G = 15Ω, V_{CC} = 300V
t_{rr}	Diode recovery time	—	110	—	ns	I_C = 400A
Q_{rr}	Diode recovery charge	—	6	—	µC	V_{GE} = ± 15V
Q_{ge}	Gate-to-emitter charge (turn-on)	156	—	252	nC	V_{CC} = 480V
Q_{gc}	Gate-to-collector charge (turn-on)	420	—	840		I_C = 324A
Q_g	Total gate charge (turn-on)	900	—	1680		V_{GE} = 15V
C_{ies}	Input capacitance	—	34800	—	pF	V_{GE} = 0V
C_{oes}	Output capacitance	—	3960	—		V_{CC} = 30V
C_{res}	Reverse transfer capacitance	—	480	—		f = 1MHz
t_{sc}	Short circuit withstand time	10	—	—	µs	V_{CC} = 360V, V_{GE} = ± 15V Min. R_G = 15Ω, V_{CEP} = 500V

(1) Includes tail losses

Thermal and Mechanical Characteristics

Parameter	Description	Typ	Max	Units
R_{thJC} (IGBT)	Thermal resistance, junction to case, each IGBT	—	0.063	°C/W
R_{thJC} (Diode)	Thermal resistance, junction to case, each diode	—	0.095	
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