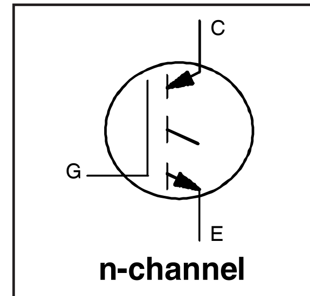
International
IOR Rectifier

PD - 97423A

IRG7CH81K10B

Features

- Low $V_{CE\ (ON)}$ Trench IGBT Technology
- Low Switching Losses
- Maximum Junction Temperature 175 °C
- 10 µS short Circuit SOA
- Square RBSOA
- Positive $V_{CE\ (ON)}$ Temperature Coefficient
- Tight Parameter Distribution



Benefits

- High Efficiency in a Wide Range of Applications
- Suitable for a Wide Range of Switching Frequencies due to Low $V_{CE\ (ON)}$ and Low Switching Losses
- Rugged Transient Performance for Increased Reliability
- Excellent Current Sharing in Parallel Operation

Applications

- Medium Power Drives
- UPS
- HEV Inverters
- Welding

Chip Type	V_{CE}	I_{Cn}	Die Size	Package
IRG7CH81K10B	1200V	150A	12.3875 mm X 12.3875 mm	Wafer

Mechanical Parameter

Parameter	Value	Unit
Die Size	12.3875 x 12.3875	mm^2
Minimum Street Width	75	µm
Emiter Pad Size (Included Gate Pad)	See Die Drawing	mm^2
Gate Pad Size	0.5035 x 0.5095	
Area Total / Active	153.45 / 122.5	
Thickness	140	µm
Wafer Size	150	mm
Flat Position	0	Degrees
Maximum-Possible Chips per Wafer	91 pcs	
Passivation Frontside	Silicon Nitride	
Front Metal	Al, Si (4µm)	
Backside Metal	Al- Ti - Ni- Ag (1kA°-1kA°-4kA°-6kA°)	
Die Bond	Electrically conductive epoxy or solder	
Reject Ink Dot Size	0.25 mm diameter minimum	
Recommended Storage Environment	Store in original container, in dry Nitrogen, <6 months at an ambient temperature of 23°C	

Maximum Ratings

	Parameter	Max.	Units
V_{CE}	Collector-Emitter Voltage, T_J=25°C	1200	V
$I_{C(Nominal)}$	Nominal Current	150 ①	A
I_{LM}	Clamped Inductive Load Current ④	600	A
V_{GE}	Gate Emitter Voltage	± 30	V
T_J, T_{STG}	Operating Junction and Storage Temperature	-40 to +175	°C

Static Characteristics (Tested on wafers) @ T_J=25°C

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	1200	—	—	V	V_{GE} = 0V, I_D = 250µA ⑤
$V_{CE(sat)}$	Collector-to-Emitter Saturated Voltage	—	1.13	1.3		V_{GS} = 15V, I_D = 20A , T_J=25°C
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	5.0	—	7.5		I_C = 7.0mA , V_{GS} = V_{CE}
I_{CES}	Zero Gate Voltage Collector Current	—	5.0	25	µA	V_{CE} = 1200V, V_{GE} = 0V
I_{GES}	Gate Emitter Leakage Current	—	—	± 400	nA	V_{CE} = 0V, V_{GE} = 30V

Electrical Characteristics (Not subject to production test- Verified by design/characterization)

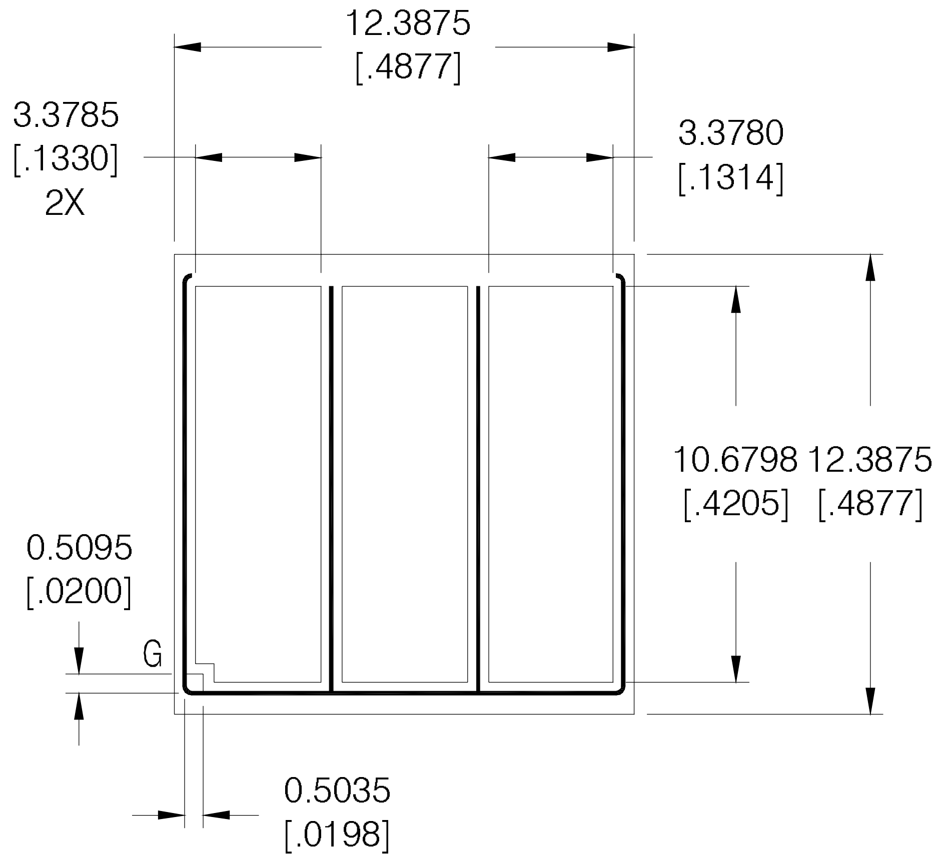
	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{CE(sat)}$	Collector-to-Emitter Saturated Voltage	—	1.95	2.25	V	V_{GS} = 15V, I_D = 150A , T_J=25°C
		—	2.45	—		V_{GS} = 15V, I_D = 150A , T_J=150°C
SCSOA	Short Circuit Safe Operating Area	10	—	—	µs	V_{GE}=15V, V_{CC}= 600V, ② R_G=1.0Ω, V_P=1200V,T_J=150°C
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 175°C, I_C = 600A V_{CC} = 960V, Vp =1200V Rg = 1.0Ω, V_{GE} = +20V to 0V
C_{iss}	Input Capacitance	—	17900	—	pF	V_{GE} = 0V
C_{oss}	Output Capacitance	—	670	—		V_{CE} = 30V
C_{rss}	Reverse Transfer Capacitance	—	490	—		f = 1.0MHz,
Q_g	Total Gate Charge (turn-on)	—	830	—	nC	I_C = 150A ⑥
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	180	—		V_{GE} = 15V
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	380	—		V_{CC} = 600V

Switching Characteristics (Inductive Load-Not subject to production test-Verified by design/ characterization)

	Parameter	Min.	Typ.	Max.	Units	Conditions ③
$t_{d(on)}$	Turn-On delay time	—	70	—	ns	I_C = 150A, V_{CC} = 600V, V_{GE} = 15V
t_r	Rise time	—	130	—		R_G = 1.0Ω, L = 100µH
$t_{d(off)}$	Turn-Off delay time	—	330	—		T_J = 25°C
t_f	Fall time	—	70	—		
$t_{d(on)}$	Turn-On delay time	—	70	—		I_C = 150A, V_{CC} = 600V, V_{GE}=15V
t_r	Rise time	—	140	—		R_G = 1.0Ω, L = 100µH
$t_{d(off)}$	Turn-Off delay time	—	450	—		T_J = 175°C
t_f	Fall time	—	110	—		

Notes:
① The current in the application is limited by T_{JMAX} and the thermal properties of the assembly.
② Not subject to production test- Verified by design / characterization.
③ Values influenced by parasitic L and C in measurement.
④ V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 100µH, R_G = 1.0Ω.
⑤ Refer to AN-1086 for guidelines for measuring $V_{(BR)CES}$ safely.
⑥ Pulse width ≤ 400µs; duty cycle ≤ 2%.

Chip drawing



NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
2. CONTROLLING DIMENSION: MILLIMETERS
3. LETTER DESIGNATION:
   S = SOURCE
   G = GATE
4. DIMENSIONAL TOLERANCES:

BONDING PADS:	< 0.635 TOLERANCE = +/- 0.013
WIDTH	< [.0250] TOLERANCE = +/- [.0005]
&	> 0.635 TOLERANCE = +/- 0.025
LENGTH	> [.0250] TOLERANCE = +/- [.0010]
OVERALL DIE:	< 1.270 TOLERANCE = +/- 0.102
WIDTH	< [.050] TOLERANCE = +/- [.004]
&	> 1.270 TOLERANCE = +/- 0.203
LENGTH	> [.050] TOLERANCE = +/- [.008]

5. DIE THICKNESS = 0.140 [.0055]

Additional Testing and Screening

For Customers requiring product supplied as Known Good Die (KGD) or requiring specific die level testing, please contact your local IR Sales.

Shipping

Three shipping options are offered.

- Un-sawn wafer
- Die in waffle pack (consult the IR Die Sales team for availability)
- Die on film (consult the IR Die Sales team for availability)

Tape and Reel is also available for some products. Please consult your local IR sales office or email http://die.irf.com for additional information.
Please specify your required shipping option when requesting prices and ordering Die product. If not specified, Un-sawn wafer will be assumed.

Handling

- Product must be handled only at ESD safe workstations. Standard ESD precautions and safe work environments are as defined in MIL-HDBK-263.
- Product must be handled only in a class 10,000 or better-designated clean room environment.
- Singulated die are not to be handled with tweezers. A vacuum wand with a non-metallic ESD protected tip should be used.

Wafer/Die Storage

- Proper storage conditions are necessary to prevent product contamination and/or degradation after shipment.
- Un-sawn wafers and singulated die can be stored for up to 12 months when in the original sealed packaging at room temperature (45% +/- 15% RH controlled environment).
- Un-sawn wafers and singulated die that have been opened can be stored when returned to their containers and placed in a Nitrogen purged cabinet, at room temperature (45% +/- 15% RH controlled environment).
- Note: To reduce the risk of contamination or degradation, it is recommended that product not being used in the assembly process be returned to their original containers and resealed with a vacuum seal process.
- Sawn wafers on a film frame are intended for immediate use and have a limited shelf life.
- Die in Surf Tape type carrier tape are intended for immediate use and have a limited shelf life. This is primarily due to the nature of the adhesive tape used to hold the product in the carrier tape cavity. This product can be stored for up to 30 days. This applies whether or not the material has remained in its original sealed container.

Further Information

For further information please contact your local IR Sales office or email your enquiry to
http://die.irf.com

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial market.
Qualification Standards can be found on IR's Web site.

International
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