

Insulated Gate Bipolar Transistor

$$V_{CES} = 600V$$

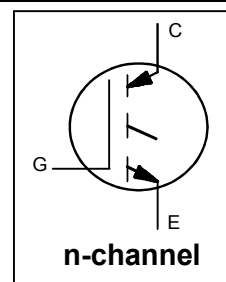
$$I_C \text{ (Nominal)} = 75A$$

$$t_{SC} \geq 5\mu s, T_{J(max)} = 175^\circ C$$

$$V_{CE(on)} \text{ typ} = 1.7V @ I_C = 75A$$

Applications

- HEV Inverter



Features	Benefits
Low $V_{CE(on)}$ Trench IGBT Technology	High efficiency in a wide range of applications
Low Switching losses	Suitable for a wide range of switching frequencies due to Low $V_{CE(on)}$ and Low switching losses
5 μs Short Circuit Capability	Rugged motor drive operation
Square RBSOA and 100% Clamp IL Tested	Rugged hard switching operation
Tight parameter distribution	Simpler system level design
Lead-Free, RoHS Compliant	Environmentally friendlier
Automotive qualified	Qualification standard can be found at http://www.irf.com

Base part number	Package Type	Standard Pack		Orderable part number
		Form	Quantity	
AUIRGC4066B	Die on Film	Wafer	1	AUIRGC4066B

Mechanical Parameter

Die Size	5.803 x 6.358	mm ²
Emitter Pad Size (Included Gate Pad)	See Die Drawing	
Gate Pad Size	0.505 X 0.5015	
Area Total / Active	36.89 / 28.11	mm ²
Thickness	70	μm
Wafer Size	150	mm
Flat Position	0	Degrees
Maximum-Possible Chips per Wafer	370 pcs	
Passivation Frontside	Silicon Nitride	
Front Metal	Al (4 μm)	
Backside Metal	Al (0.1 μm), Ti (0.1 μm), Ni (0.4 μm), Ag (0.6 μm)	
Die Bond	Electrically conductive epoxy or solder	
Reject Ink Dot Size	0.25mm min (black, center)	
Recommended Storage Environment	Store in original container, in dry Nitrogen,	
	<6 months at an ambient temperature of 23°C	

Note:

- ① This IR product is 100% tested at wafer level and is manufactured using established, mature and well characterized processes. Due to restrictions in die level processing, die may not be equivalent to standard package products and are therefore offered with a conditional performance guarantee. The above data sheet is based on IR sample testing under certain predetermined and assumed conditions, and are provided for illustration purposes only. Customers are encouraged to perform testing in actual proposed package and use conditions. IR die products are tested using IR-based quality assurance procedures and are manufactured using IR's established processes. Programs for Customer specified testing are available upon request. IR has experienced assembly yields of generally 95% or greater for individual die; however, customer's results will vary. Estimates such as those described and set forth in this data sheet for semiconductor die will vary depending on a number of packaging, handling, use and other factors. Sold die may not perform on an equivalent basis to standard package products and are therefore offered with a limited warranty as described in IR's applicable standard terms and conditions of sale. All IR die sales are subject to IR's applicable standard terms and conditions of sale, which are available upon request. For customers requiring a particular parameter to be guaranteed, special testing can be carried out or product can be purchased as known good die.
- ② Technology qualified in TO247 package according to AEC-Q101.

Maximum Ratings

	Parameter	Max.	Units
V_{CE}	Collector-Emitter Voltage, $T_J=25^\circ\text{C}$	600	V
I_C	DC Collector Current	①	A
I_{LM}	Clamped Inductive Load Current ②	300	A
V_{GE}	Gate Emitter Voltage	± 20	V
T_J, T_{STG}	Operating Junction and Storage Temperature	-40 to +175	$^\circ\text{C}$

Static Characteristics (Tested on wafers) . $T_J=25^\circ\text{C}$

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	600	—	—	V	$V_{GE} = 0\text{V}, I_C = 100\mu\text{A}$ ③
$V_{CE(sat)}$	Collector-to-Emitter Saturated Voltage	—	1.0	1.3		$V_{GE} = 15\text{V}, I_C = 10\text{A}, T_J = 25^\circ\text{C}$
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	4.0	—	6.5		$I_C = 2.1\text{mA}, V_{CE} = V_{CE}$
I_{CES}	Zero Gate Voltage Collector Current	—	1.0	20	μA	$V_{CE} = 600\text{V}, V_{GE} = 0\text{V}$
I_{GES}	Gate Emitter Leakage Current	—	—	± 200	nA	$V_{CE} = 0\text{V}, V_{GE} = \pm 20\text{V}$

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	—	1.7	2.1	V	$V_{GE} = 15\text{V}, I_C = 75\text{A}, T_J = 25^\circ\text{C}$ ④
		—	2.1	—		$V_{GE} = 15\text{V}, I_C = 75\text{A}, T_J = 175^\circ\text{C}$ ④
SCSOA	Short Circuit Safe Operating Area	5	—	—	μS	$T_J = 150^\circ\text{C}, V_{CC} = 400\text{V}$ $R_g = 10\Omega, V_p \leq 600\text{V}, V_{GE} = +15\text{V to } 0\text{V}$
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				$T_J = 175^\circ\text{C}, I_C = 300\text{A}$ $V_{CC} = 480\text{V}, V_p \leq 600\text{V}$ $R_g = 10\Omega, V_{GE} = +20\text{V to } 0\text{V}$
C_{iss}	Input Capacitance	—	4470	—	pF	$V_{GE} = 0\text{V}$
C_{oss}	Output Capacitance	—	350	—		$V_{CE} = 30\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	150	—		$f = 1.0\text{MHz}$,
Q_g	Total Gate Charge (turn-on)	—	150	—	nC	$I_C = 75\text{A}$
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	40	—		$V_{GE} = 15\text{V}$
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	60	—		$V_{CC} = 400\text{V}$

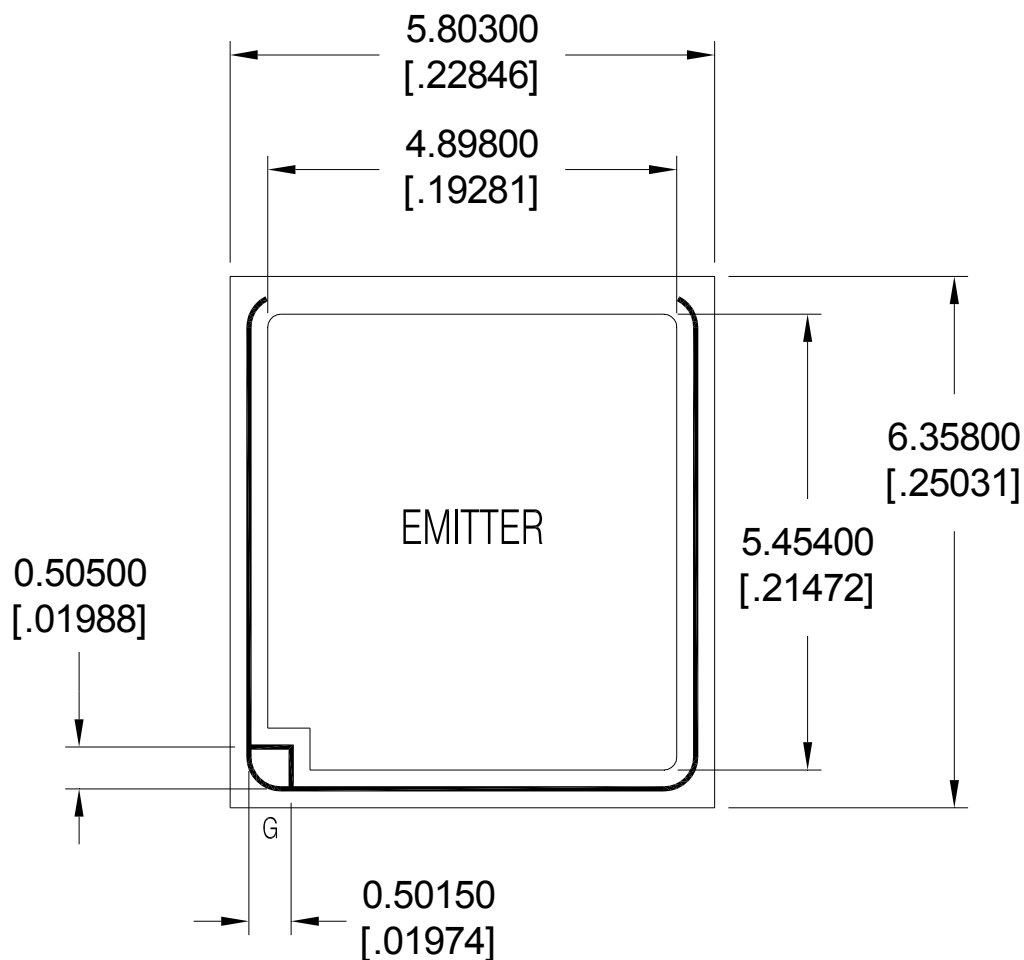
Switching Characteristics (Inductive Load-Not subject to production test-Verified by design/characterization)

	Parameter	Min.	Typ.	Max.	Units	Conditions ⑤
$t_{d(on)}$	Turn-On delay time	—	50	—	ns	$I_C = 75\text{A}, V_{CC} = 400\text{V}$ $R_G = 10\Omega, V_{GE}=15\text{V}, L=100\mu\text{H}$ $T_J = 25^\circ\text{C}$
t_r	Rise time	—	80	—		
$t_{d(off)}$	Turn-Off delay time	—	200	—		
t_f	Fall time	—	60	—		
$t_{d(on)}$	Turn-On delay time	—	45	—		$I_C = 75\text{A}, V_{CC} = 400\text{V}$ $R_G = 10\Omega, V_{GE}=15\text{V}, L= 100\mu\text{H}$ $T_J = 175^\circ\text{C}$
t_r	Rise time	—	70	—		
$t_{d(off)}$	Turn-Off delay time	—	240	—		
t_f	Fall time	—	80	—		

Notes:

- ① The current in the application is limited by T_{JMax} and the thermal properties of the assembly.
- ② $V_{CC} = 80\% (V_{CES}), V_{GE} = 20\text{V}, L = 100\mu\text{H}, R_G = 10\Omega$.
- ③ Refer to AN-1086 for guidelines for measuring $V_{(BR)CES}$ safely
- ④ Die Level Characterization
- ⑤ Values influenced by parasitic L and C in measurement

Die Drawing



NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
2. CONTROLLING DIMENSION: INCHES
3. DIE WIDTH AND LENGTH TOLERANCE: -0.0508 [.002]
4. DIE THICKNESS = 0.070 [.0028] TOL = \pm 0.007 [.0003]

REFERENCE: IRGC4066B
 IRGP4066PBF
 IRGP4066-EPBF
 IRGP4066DPBF
 IRGP4066D-EPBF

AUIRGC4066B
 AUIRGP4066D1

Chip drawings available upon request

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>

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For technical support, please contact IR's Technical Assistance Center

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