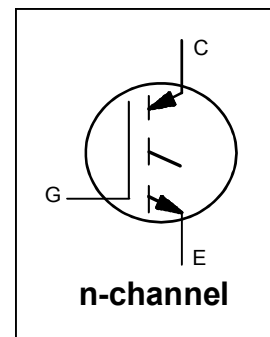


**INSULATED GATE BIPOLAR TRANSISTOR**

$V_{CES} = 1200V$   
 $I_{C(Nominal)} = 50A$   
 $T_{J(max)} = 175^{\circ}C$   
 $V_{CE(on)} \text{ typ} = 1.9V @ I_C = 50A$



**Applications**

- Medium Power Drives
- UPS
- HEV Inverter
- Welding

G	C	E
Gate	Collector	Emitter

Features	Benefits
Low $V_{CE(ON)}$ and switching Losses	High efficiency in a wide range of applications
10 $\mu$ s Short Circuit SOA and Square RBSOA	Rugged Transient Performance
Maximum Junction Temperature 175 $^{\circ}C$	Increased Reliability
Positive $V_{CE(ON)}$ Temperature Coefficient	Excellent current sharing in parallel operation

Base part number	Package Type	Standard Pack		Orderable part number
		Form	Quantity	
IRG7CH54K10EF-R	Die on film	Wafer	1	IRG7CH54K10EF-R

**Mechanical Parameter**

Die Size	7.55 x 7.55	mm <sup>2</sup>
Minimum Street Width	75	$\mu$ m
Emitter Pad Size (Included Gate Pad)	See Die Drawing	mm <sup>2</sup>
Gate Pad Size	1.0 x 0.7	
Area Total / Active	57/39.64	
Thickness	140	$\mu$ m
Wafer Size	200	mm
Flat Position	0	Degrees
Maximum-Possible Chips per Wafer	465 pcs	
Passivation Front side	Silicon Nitride	
Front Metal	Al, Si (4 $\mu$ m)	
Backside Metal	Al- Ti - Ni- Ag (1kA $^{\circ}$ -1kA $^{\circ}$ -4kA $^{\circ}$ -6kA $^{\circ}$ )	
Die Bond	Electrically conductive epoxy or solder	
Reject Ink Dot Size	0.25 mm diameter minimum	

**Maximum Ratings**

	Parameter	Max.	Units
$V_{CE}$	Collector-Emitter Voltage, $T_J=25^\circ\text{C}$	1200	V
$I_C$	DC Collector Current	①	A
$I_{LM}$	Clamped Inductive Load Current ②	200	A
$V_{GE}$	Gate Emitter Voltage	$\pm 30$	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	1200	—	—	V	$V_{GE} = 0V, I_C = 250\mu\text{A}$ ③
$V_{CE(sat)}$	Collector-to-Emitter Saturated Voltage	—	1.45	1.70		$V_{GE} = 15V, I_C = 15A, T_J = 25^\circ\text{C}$
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	5.0	—	7.5		$I_C = 2.4\text{mA}, V_{GE} = V_{CE}$
$I_{CES}$	Zero Gate Voltage Collector Current	—	1.0	25	$\mu\text{A}$	$V_{CE} = 1200V, V_{GE} = 0V$
$I_{GES}$	Gate Emitter Leakage Current	—	—	$\pm 200$	nA	$V_{CE} = 0V, V_{GE} = \pm 30V$

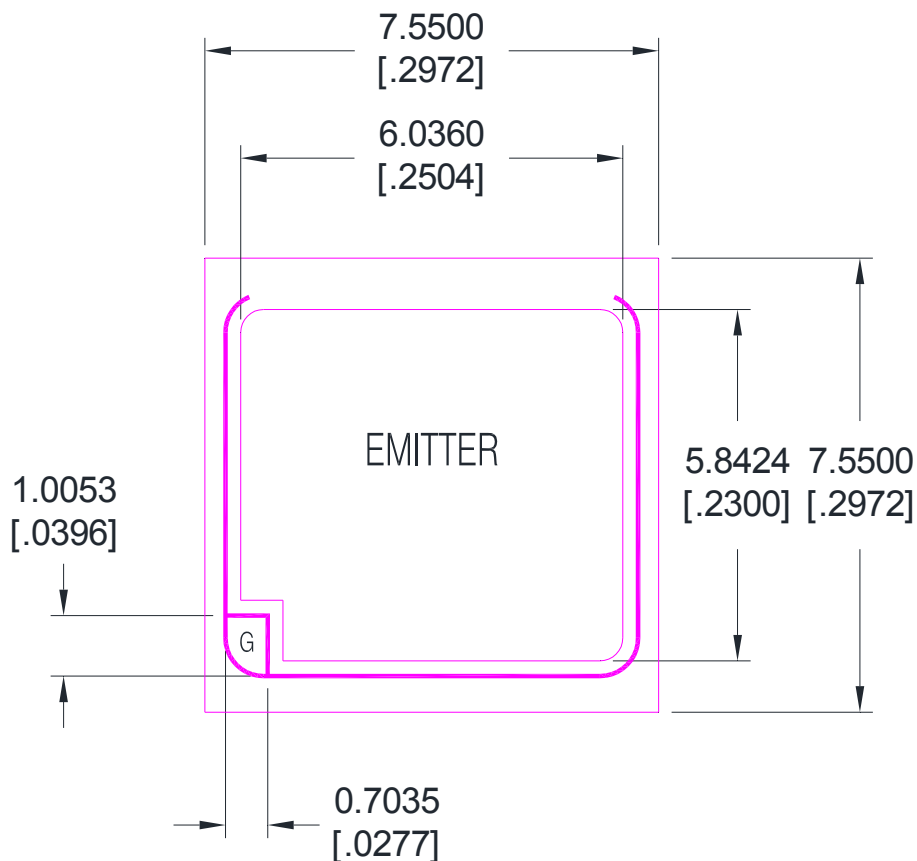
**Electrical Characteristics (Not subject to production test- Verified by design/characterization)**

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{CE(sat)}$	Collector-to-Emitter Saturated Voltage	—	1.9	2.3	V	$V_{GE} = 15V, I_C = 50A, T_J = 25^\circ\text{C}$ ④
		—	2.5	—		$V_{GE} = 15V, I_C = 50A, T_J = 175^\circ\text{C}$ ④
SCSOA	Short Circuit Safe Operating Area	10	—	—	$\mu\text{s}$	$V_{GE}=15V, V_{CC}=600V,$ ⑤ $R_g = 5\Omega, V_p \leq 1200V, T_J = 150^\circ\text{C}$
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				$T_J = 175^\circ\text{C}, I_C = 200A$ $V_{CC} = 960V, V_p \leq 1200V$ $R_g = 5\Omega, V_{GE} = +20V \text{ to } 0V$
$C_{iss}$	Input Capacitance	—	5740	—	pF	$V_{GE} = 0V$
$C_{oss}$	Output Capacitance	—	220	—		$V_{CE} = 30V$
$C_{rss}$	Reverse Transfer Capacitance	—	130	—		$f = 1.0\text{MHz},$
$Q_g$	Total Gate Charge (turn-on)	—	240	—	nC	$I_C = 50A$ ⑥
$Q_{ge}$	Gate-to-Emitter Charge (turn-on)	—	60	—		$V_{GE} = 15V$
$Q_{gc}$	Gate-to-Collector Charge (turn-on)	—	110	—		$V_{CC} = 600V$

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

	Parameter	Min.	Typ.	Max.	Units	Conditions ⑥ ⑦
$t_{d(on)}$	Turn-On delay time	—	75	—	ns	$I_C = 50A, V_{CC} = 600V$ $R_G = 5\Omega, V_{GE}=15V, L=200\mu\text{H}$ $T_J = 25^\circ\text{C}$
$t_r$	Rise time	—	60	—		
$t_{d(off)}$	Turn-Off delay time	—	305	—		
$t_f$	Fall time	—	55	—		
$t_{d(on)}$	Turn-On delay time	—	70	—		$I_C = 50A, V_{CC} = 600V$ $R_G = 5\Omega, V_{GE}=15V, L= 200\mu\text{H}$ $T_J = 175^\circ\text{C}$
$t_r$	Rise time	—	60	—		
$t_{d(off)}$	Turn-Off delay time	—	345	—		
$t_f$	Fall time	—	185	—		

# 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 = 0.140 [.0055]

**Notes:**

- ① The current in the application is limited by  $T_{JMax}$  and the thermal properties of the assembly.
- ②  $V_{CC} = 80\% (V_{CES})$ ,  $V_{GE} = 20V$ ,  $L = 19\mu H$ ,  $R_G = 5\Omega$ .
- ③ Refer to AN-1086 for guidelines for measuring  $V_{(BR)CES}$  safely
- ④ Die Level Characterization
- ⑤ Not subject to production test-Verified by design / characterization
- ⑥ Pulse width limited by junction temperature
- ⑦ Values influenced by parasitic L and C in measurement

**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**

Sawn Wafer on Film. Please contact your local IR sales office for non– standard shipping options

**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.
- 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.

**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  
**IOR** Rectifier

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