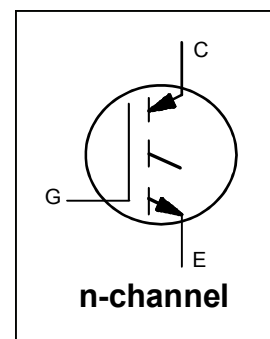


$V_{CES} = 1200V$   
 $I_{C(Nominal)} = 40A$   
 $T_{J(max)} = 175^{\circ}C$   
 $V_{CE(on)} \text{ typ} = 1.7V @ I_C = 40A$



**Applications**

- Industrial Motor Drives
- UPS
- HEV Inverter
- Welding

G	C	E
Gate	Collector	Emitter

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
Very Soft Turn-off Characteristics	Reduced EMI and Overvoltage in Motor Drive Applications
10 $\mu$ s Short Circuit SOA	Rugged Transient Performance for Increased Reliability
Square RBSOA	
Tight Parameter Distribution	Excellent Current Sharing in Parallel Operation
Positive $V_{CE(on)}$ Temperature Coefficient	
$T_{J(max)} = 175^{\circ}C$	Increased Reliability

Base part number	Package Type	Standard Pack		Orderable part number
		Form	Quantity	
IRG8CH42K10F	Die on Film	Wafer	1	IRG8CH42K10F

**Mechanical Parameter**

Die Size	6.4 x 6.6	mm <sup>2</sup>
Minimum Street Width	95	$\mu$ m
Emitter Pad Size	See Die Drawing	mm <sup>2</sup>
Gate Pad Size	1.0 x 0.6	
Area Total / Active	41.6 / 26.8	
Thickness	140	$\mu$ m
Wafer Size	200	mm
Notch Position	0	Degrees
Maximum-Possible Chips per Wafer	642 pcs.	
Passivation Front side	Silicon Nitride, Polyimide	
Front Metal	Al, Si (5.6 $\mu$ m)	
Backside Metal	Al, Ti, Ni, Ag	
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	120	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	$V_{GE} = 0\text{V}, I_C = 250\mu\text{A}$ ③
$V_{CE(sat)}$	Collector-to-Emitter Saturated Voltage	—	—	2.0		$V_{GE} = 15\text{V}, I_C = 40\text{A}, T_J = 25^\circ\text{C}$ ④
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	5.0	—	6.5		$I_C = 1.6\text{mA}, V_{GE} = V_{CE}$
$I_{CES}$	Zero Gate Voltage Collector Current	—	1.0	25	$\mu\text{A}$	$V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}$
$I_{GES}$	Gate Emitter Leakage Current	—	—	$\pm 400$	nA	$V_{CE} = 0\text{V}, V_{GE} = \pm 30\text{V}$

**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	—	V	$V_{GE} = 15\text{V}, I_C = 40\text{A}, T_J = 25^\circ\text{C}$ ⑤
		—	2.1	—		$V_{GE} = 15\text{V}, I_C = 40\text{A}, T_J = 175^\circ\text{C}$ ⑤
SCSOA	Short Circuit Safe Operating Area	10	—	—	$\mu\text{s}$	$V_{GE} = 15\text{V}, V_{CC} = 600\text{V}$ $V_P \leq 1200\text{V}, T_J = 150^\circ\text{C}$
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				$T_J = 175^\circ\text{C}, I_C = 120\text{A}$ $V_{CC} = 960\text{V}, V_P \leq 1200\text{V}$ $V_{GE} = +20\text{V to } 0\text{V}$
$C_{iss}$	Input Capacitance	—	3700	—	pF	$V_{GE} = 0\text{V}$
$C_{oss}$	Output Capacitance	—	215	—		$V_{CE} = 30\text{V}$
$C_{rss}$	Reverse Transfer Capacitance	—	120	—		$f = 1.0\text{MHz}$
$Q_g$	Total Gate Charge (turn-on)	—	230	—	nC	$I_C = 40\text{A}$ ⑤
$Q_{ge}$	Gate-to-Emitter Charge (turn-on)	—	15	—		$V_{GE} = 15\text{V}$
$Q_{gc}$	Gate-to-Collector Charge (turn-on)	—	140	—		$V_{CC} = 600\text{V}$

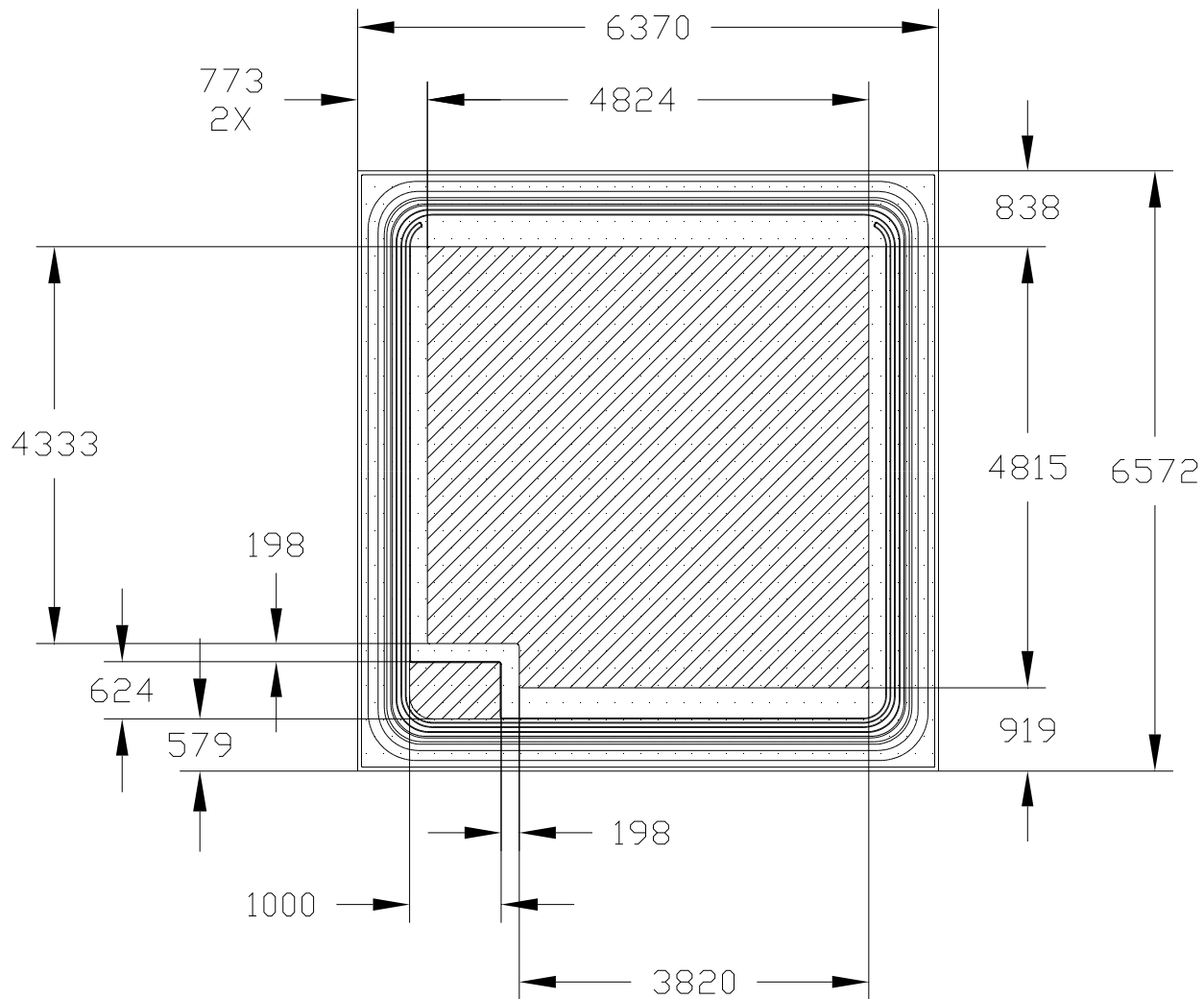
**Switching Characteristics (Inductive Load-Not subject to production test-Verified by design/characterization)**

	Parameter	Min.	Typ.	Max.	Units	Conditions ⑥
$t_{d(on)}$	Turn-On delay time	—	40	—	ns	$I_C = 40\text{A}, V_{CC} = 600\text{V}$ $R_G = 5.0\Omega, V_{GE} = 15\text{V}$ $T_J = 25^\circ\text{C}$
$t_r$	Rise time	—	30	—		
$t_{d(off)}$	Turn-Off delay time	—	240	—		
$t_f$	Fall time	—	110	—		$I_C = 40\text{A}, V_{CC} = 600\text{V}$ $R_G = 5.0\Omega, V_{GE} = 15\text{V}$ $T_J = 150^\circ\text{C}$
$t_{d(on)}$	Turn-On delay time	—	40	—		
$t_r$	Rise time	—	30	—		
$t_{d(off)}$	Turn-Off delay time	—	310	—		
$t_f$	Fall time	—	110	—		

**Notes:**

- ① The current in the application is limited by  $T_{JMax}$  and the thermal properties of the assembly.
- ②  $V_{CC} = 80\% (V_{CES}), V_{GE} = 20\text{V}$ .
- ③ Refer to AN-1086 for guidelines for measuring  $V_{(BR)CES}$  safely.
- ④ Actual test limits take into account additional losses in the measurement setup.
- ⑤ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ⑥ Values influenced by parasitic L and C in measurement.

# Die Drawing



### NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MICRO-METER
2. CONTROLLING DIMENSION: MICRO-METER
3. DIE WIDTH AND LENGTH TOLERANCE:  $-50\mu\text{m}$
4. DIE THICKNESS = 140 MICRO-METER

### 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.

### Revision History

Date	Comments
09/26/2014	<ul style="list-style-type: none"> <li>• Updated Front Metal from "Al, Si(4um)" to "Al, Si (5.6um)" on page 1.</li> <li>• Updated Die drawing and removed reference part number from Die drawing on page 3.</li> </ul>
06/03/2015	<ul style="list-style-type: none"> <li>• Updated Switch time on page 2.</li> <li>• Updated IFX logo on page 1 &amp; 4.</li> </ul>