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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

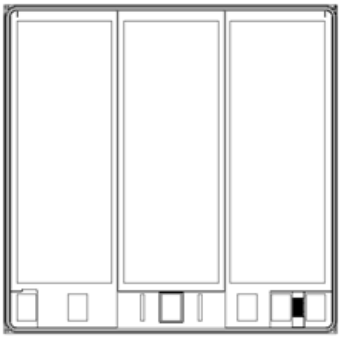
August 2016

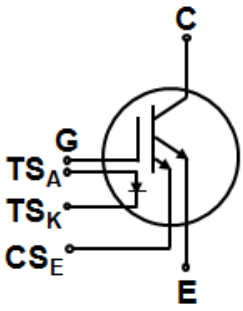
PCGA300T65DF8

650V, 300A Field Stop Trench IGBT

Features

- AEC-Q101 Qualified
- Max Junction Temperature 175°C
- Positive Temperature Co-efficient
- Ease of Paralleling
- Short Circuit Rated
- Very Low Saturation Voltage: V_{CESAT} = 1.36V (Typ.) @ I_C = 300A
- Optimized for Motor Control Applications
- Integrated Temp Sensor and Current Sensor





Applications

- Automotive Traction Modules
- General Power Modules

Ordering Information

P/N	PCGA300T65DF8	
Packing	Wafer (Sawn-On-Foil)	
	mils	μm
Die Size	472 x 472	12,000 x 12,000
Emitter Attach Area	3 x (133 x 375)	3 x (3,390 x 9,530)
Gate / Sensor Pad Attach Area	6 x (27 x 39)	6 x(680 x 980)
Scribe Lane	3.14	80
Die Thickness	3	78
Top Metal	Al (0.5% Cu, 0.8% Si)	
Back Metal	Al/VNi/Ag	
Topside Passivation	Silicon Nitride Plus Polyimide	
Wafer Diameter	200mm	
Max Possible Die Per Wafer	136	

Absolute Maximum Ratings (T_{VJ}= 25°C unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{CES}	Collector to Emitter Voltage	650	V
V_{GES}	Gate-to-Emitter Voltage	±20	V
I_C	Collector Current, limited by T_{VJ} max	(Note 1)	A
I_{CM}	Pulsed Collector Current, VGE=15V, limited by T_{VJ} max	900	A
$S_{CWT\ 1)}$	Short Circuit Withstand Time, VGE= 15V, VCE≤400V, T_{VJ}≤150ºC	5	μs
T_{VJ}	Operating Junction Temperature	-40 to +175	°C
Tstg	Storage Temperature Range	+17 to +25	°C

Notes:
1: Depends on the thermal properties of assembly

Electrical Characteristics of the IGBT (T_{VJ} = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Static Characteristics (Tested on wafers)						
B_{VCES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 1mA	650	-	-	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_C = 100A, V_{GE} = 15V	-	1.15	1.55	V
$V_{GE(th)}$	G-E Threshold Voltage	V_{GE} = V_{CE}, I_C = 300mA	4.5	5.5	6.5	V
I_{CES}	Collector Cut-Off Current	V_{CE} = V_{CES}, V_{GE} = 0V,	-	-	40	μA
I_{GES}	G-E Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0V,	-	-	±400	nA
V_F	On-chip temperature-sense diode voltage	I_F = 0.5mA	2.0	2.4	2.8	V
Integrated Temp and Current Sensor Characteristics (not subjected to production test - verified by design / characterization						
V_F	On-chip temperature-sense diode voltage	I_F = 0.5mA, T_{VJ} = 100°C	-	1.9	-	V
β_{AREA}	Emitter Sense Area Ratio	Sense Area/Total Area		1/10K		-
$\beta_{10\Omega}$	Emitter Current Sense Ratio	I_{CE} = 300A, V_{GE} = 15V, R_{SENSE}= 10Ω	-	18K	-	-

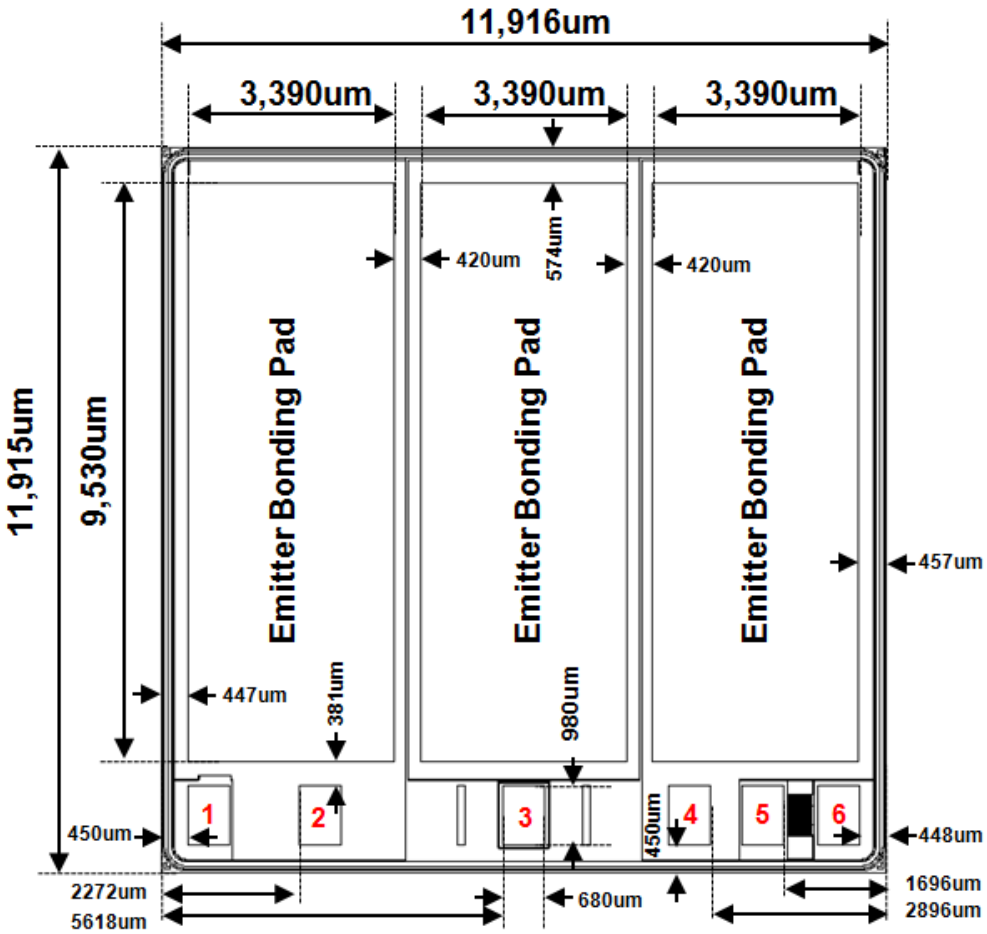
Electrical Characteristics (Not subject to production test, verified by design /characterization)

$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_C = 300A, V_{GE} = 15V	T_{VJ} = 25°C	-	1.36	1.9	V
			T_{VJ} = 175°C	-	1.65	-	V
C_{IES}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz		-	13.6	-	nF
C_{OES}	Output Capacitance			-	690	-	pF
C_{RES}	Reverse Transfer Capacitance			-	115	-	pF
R_G	Internal Gate Resistance	f = 1MHz		-	2.2	-	Ω
$Q_{G(ToT)}$	Total Gate Charge	V_{CE} = 400V, I_C = 300A, V_{GE} = 15V		-	312	-	nC
Q_{GE}	Gate-to-Emitter Charge			-	112	-	nC
Q_{GC}	Gate-to-Collector Charge			-	101	-	nC
$t_{d(on)}$	Turn-On Delay Time	V_{CE} = 300V, I_C = 300A, R_G = 15Ω, V_{GE} = 15V, Inductive Load, T_{VJ} = 25°C		-	128	-	ns
t_r	Rise Time			-	95	-	ns
$t_{d(off)}$	Turn-Off Delay Time			-	514	-	ns
t_f	Fall Time			-	67	-	ns
$t_{d(on)}$	Turn-On Delay Time	V_{CE} = 300V, I_C = 300A, R_G = 15Ω, V_{GE} = 15V, Inductive Load, T_{VJ} = 150°C		-	117	-	ns
t_r	Rise Time			-	108	-	ns
$t_{d(off)}$	Turn-Off Delay Time			-	560	-	ns
t_f	Fall Time			-	78	-	ns

For ordering, technique and other information on Fairchild automotive bare die products, please contact automotivedie@fairchildsemi.com

August 2016

Physical Dimensions Dimension in micrometer unless otherwise noted



1. Current Sense Bonding Pad
2. Emitter Sense Bonding Pad
3. Gate Bonding Pad
4. Emitter Sense Bonding Pad
5. Temp Sense Anode Bonding Pad
6. Temp Sense Cathode Bonding Pad

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Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I77

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