

AFGH40T65SQDN

Product Preview

IGBT for Automotive Applications

650 V, 40 A, TO-247-3L

Features

- Maximum Junction Temperature: $T_J = 175^\circ\text{C}$
- High Speed Switching Series
- $V_{CE(sat)} = 1.6\text{ V (typ.) @ } I_C = 40\text{ A}$
- Low V_F Soft Recovery Co-packaged Diode
- Tight Parameters Distribution
- Low Thermal Resistance
- Qualified with AEC-Q101
- These Devices are Pb-Free and are RoHS Compliant

Typical Applications

- Automotive On Board Charger
- Automotive DC/DC Converter for HEV

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Value	Unit
Collector to Emitter Voltage	V_{CES}	650	V
Transient Gate-to-Emitter Voltage	V_{GS}	± 20	V
Collector Current ($T_C = 25^\circ\text{C}$)	I_C	80	A
Collector Current ($T_C = 100^\circ\text{C}$)		40	A
Pulsed Collector Current	I_{CM}	160	A
Diode Forward Current ($T_C = 25^\circ\text{C}$)	I_F	80	A
Diode Forward Current ($T_C = 100^\circ\text{C}$)		40	A
Pulsed Diode Maximum Forward Current	I_{FM}	TBD	A
Maximum Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	238	W
Maximum Power Dissipation ($T_C = 100^\circ\text{C}$)		119	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface-mounted on FR4 board using 1 in^2 pad size, 1 oz Cu pad.

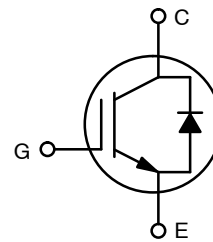
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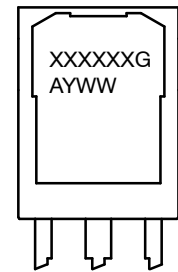
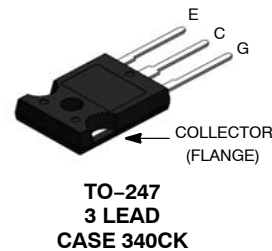
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BV_{CES}	$V_{CE(sat)}$ TYP	I_C MAX
650 V	1.6 V	80 A



MARKING DIAGRAM



XXXXXX = Specific Device Code
 A = Assembly Location
 Y = Year
 WW = Work Week
 G = Pb-Free Package

ORDERING INFORMATION

Device	Package	Shipping†
AFGH40T65SQDN	TO-247 3L	450 / Tube

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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Table 1. THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Case IGBT – Steady State (Note 2)	$R_{\theta JC}$	0.63	°C/W
Junction-to-Case Diode – Steady State (Note 2)	$R_{\theta JC}$	1.71	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	40	

2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

Table 2. ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector to Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0\text{ V}, I_D = 1\text{ mA}$	650			V
Temperature Coefficient of Breakdown Voltage	$\Delta V_{CES} / \Delta T_J$	$V_{GE} = 0\text{ V}, I_D = 1\text{ mA}$		0.6		mV/°C
Collector Cut-Off Current	I_{CES}	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$			250	μA
G-E Leakage Current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$			±400	μA

ON CHARACTERISTICS

Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 40\text{ mA}$		4.5		V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 40\text{ A}, V_{GE} = 15\text{ V}, T_C = 25^\circ\text{C}$		1.6		V
		$I_C = 40\text{ A}, V_{GE} = 15\text{ V}, T_C = 175^\circ\text{C}$		1.9		V

DYNAMIC CHARACTERISTICS

Input Capacitance	C_{ISS}	$V_{CE} = 30\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$		2620		pF
Output Capacitance	C_{OSS}			60		
Reverse Transfer Capacitance	C_{RSS}			9		

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$T_{d(on)}$	$V_{CC} = 400\text{ V}, I_C = 40\text{ A}, R_G = 6\ \Omega,$ $V_{GE} = 15\text{ V},$ Inductive Load, $T_C = 25^\circ\text{C}$		17.6		ns
Rise Time	T_r			9.6		ns
Turn-Off Delay Time	$T_{d(off)}$			80		ns
Fall Time	T_f			8.8		ns
Turn-On Switching Loss	E_{on}			TBD		μJ
Turn-Off Switching Loss	E_{off}			84		μJ
Total Switching Loss	E_{ts}		TBD		μJ	
Turn-On Delay Time	$T_{d(on)}$	$V_{CC} = 400\text{ V}, I_C = 40\text{ A}, R_G = 6\ \Omega,$ $V_{GE} = 15\text{ V},$ Inductive Load, $T_C = 175^\circ\text{C}$		16		ns
Rise Time	T_r			11.2		ns
Turn-Off Delay Time	$T_{d(off)}$			91.2		ns
Fall Time	T_f			8		ns
Turn-On Switching Loss	E_{on}			TBD		μJ
Turn-Off Switching Loss	E_{off}			240		μJ
Total Switching Loss	E_{ts}		TBD		μJ	

DIODE CHARACTERISTICS

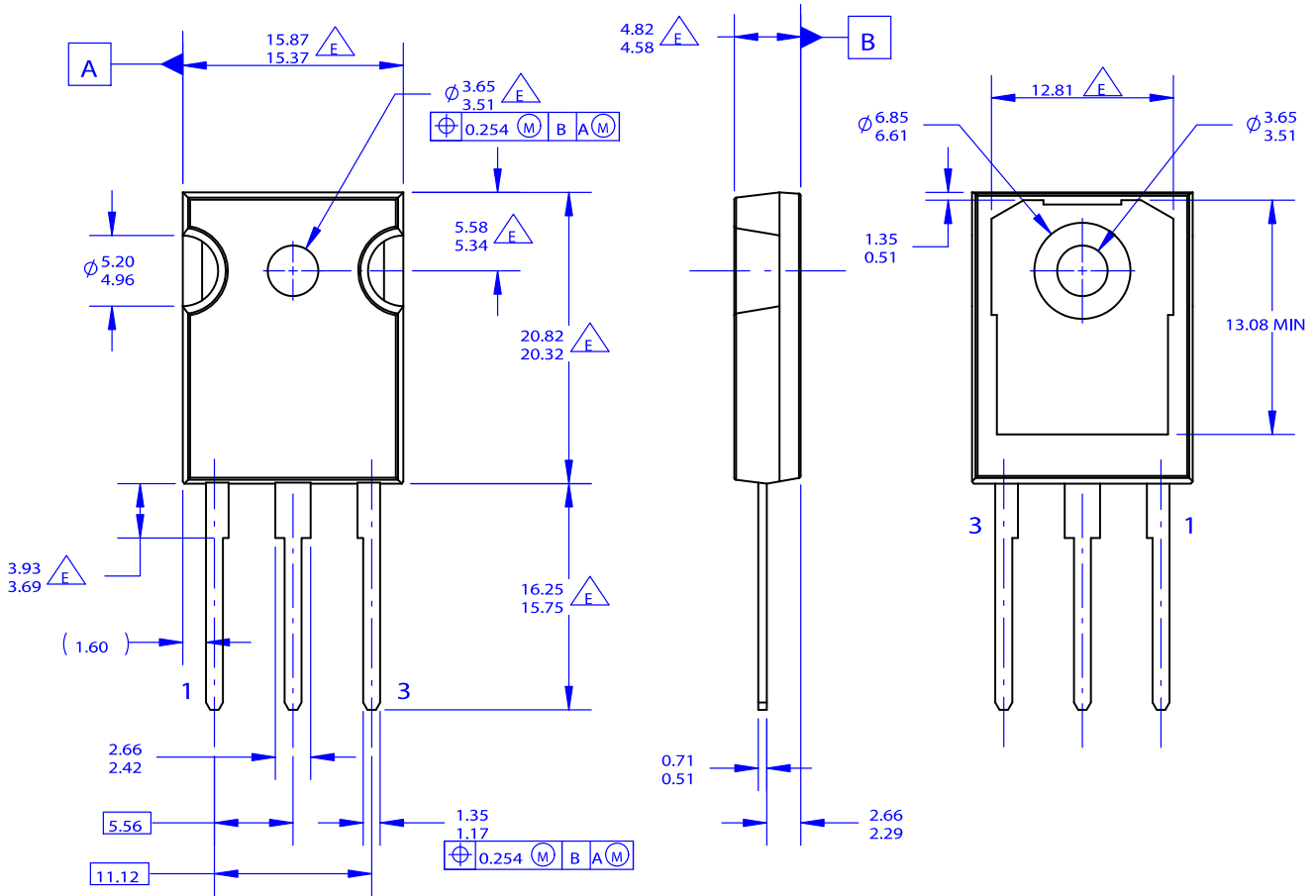
Diode Forward Voltage	V_F	$I_F = 20\text{ A}$		TBD		V
Reverse Recovery Energy	E_{rec}	$I_F = 20\text{ A}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$		TBD		μJ
Diode Reverse Recovery Time	T_{rr}			TBD		Ns
Diode Reverse Recovery Charge	Q_{rr}			TBD		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AFGH40T65SQDN

PACKAGE DIMENSIONS

TO-247-3LD
CASE 340CK
ISSUE O



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

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