Ultrafast Diode
60 A, 400 V

FFH60UP40S, FFH60UP40S3

Description

The FFH60UP40S, FFH60UP40S3 is an ultrafast diode with low forward voltage drop and rugged UIS capability. This device is intended for use as freewheeling and clamping diodes in a variety of switching power supplies and other power switching applications. It is specially suited for use in switching power supplies and industrial applicationa as welder and UPS application.

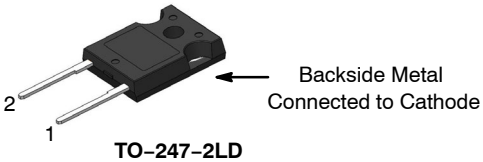
Features

- Ultrafast Recovery,T_{rr} = 85 ns (@ I_F = 60 A)
- Max Forward Voltage, V_F = 1.3 V (@ T_C = 25°C)
- Avalanche Energy Rated
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- General Purpose
- SMPS, Welder, UPS
- Free−wheeling Diode for Motor Application
- Power Switching Circuits

PIN ASSIGNMENTS



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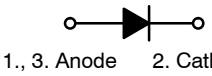
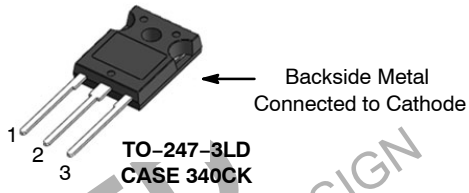
CASE 340CL



1., 3. Anode 2. Cathode



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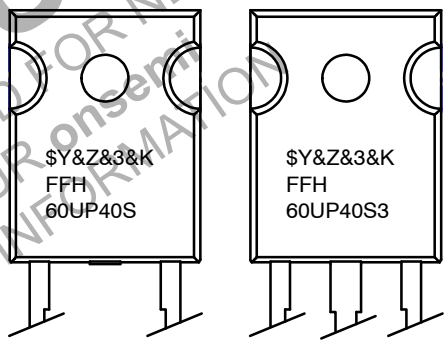
MARKING DIAGRAM



$Y	= **onsemi** Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FFH60UP40Sx	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{RRM}	Peak Repetitive Reverse Voltage	400	V
V_{RWM}	Working Peak Reverse Voltage	400	V
V_R	DC Blocking Voltage	400	V
$I_{F(AV)}$	Average Rectified Forward Current @ T_C = 139°C	60	A
I_{FSM}	Non−repetitive Peak Surge Current 60 Hz Single Half−Sine Wave	600	A
T_J, T_{STG}	Operating and Storage Temperature Range	−65 to +150	°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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	0.2	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Symbol	Parameter		Min	Typ	Max	Unit
V_F (Note 1)	I_F = 60 A	T_C = 25°C	–	1.06	1.3	V
		T_C = 100°C	–	0.99	–	
I_R (Note 1)	V_R = 400 V	T_C = 25°C	–	–	100	μA
		T_C = 100°C	–	–	500	
t_{rr}	I_F = 60 A, di_F/dt = 200 A/μs, V_R = 260 V	T_C = 25°C	–	59	85	ns
		T_C = 100°C	–	96	–	
W_{AVL}	Avalanche Energy (L = 40 mH)		50	–	–	mJ

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.

1. Pulse: Test Pulse Width = 300 μs, Duty Cycle = 2%

ORDERING INFORMATION

Part Number	Device Marking	Package	Shipping
FFH60UP40S	FFH60UP40S	TO−247−2LD (Pb-Free / Halogen Free)	450 Units / Tube
FFH60UP40S3	FFH60UP40S3	TO−247−3LD (Pb-Free / Halogen Free)	450 Units / Tube

TEST CIRCUIT AND WAVEFORM

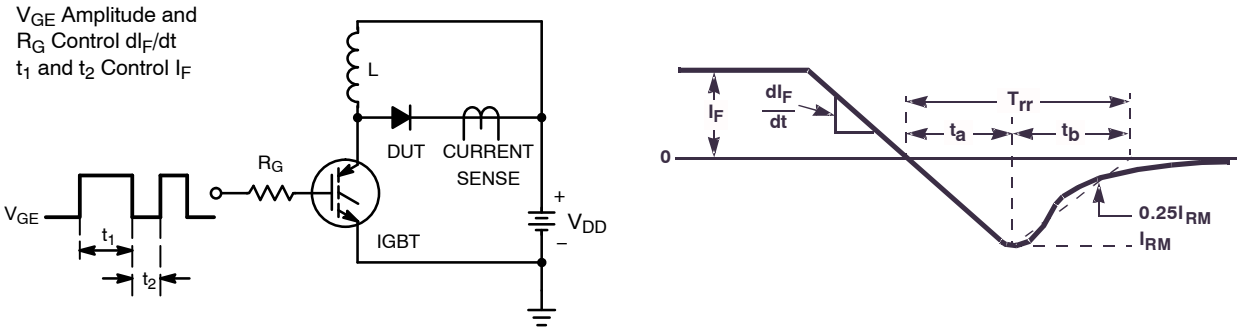


Figure 1. Diode Reverse Recovery Test Circuit and Waveform

L = 40 mH
R < 0.1 Ω
V_{DD} = 50 V
EAVL = 1/2LI2 [$V_{R(AVL)}$ / ($V_{R(AVL)}$ – V_{DD})]
Q1 = IGBT (BV_{CES} > DUT $V_{R(AVL)}$)

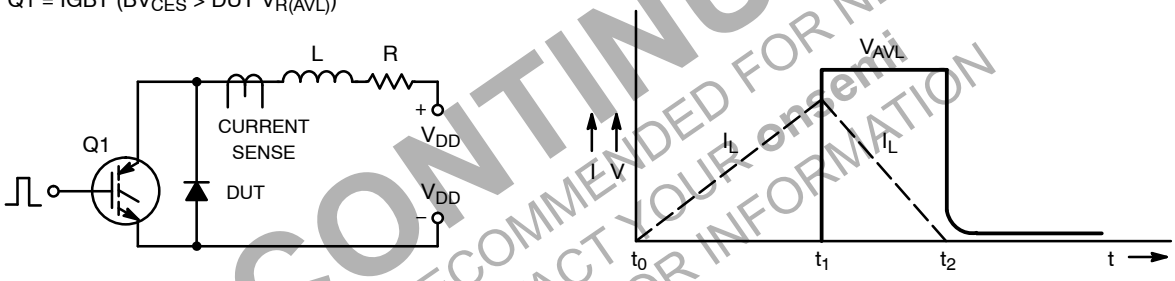


Figure 2. Unclamped Inductive Switching Test Circuit & Waveform

TYPICAL PERFORMANCE CHARACTERISTICS

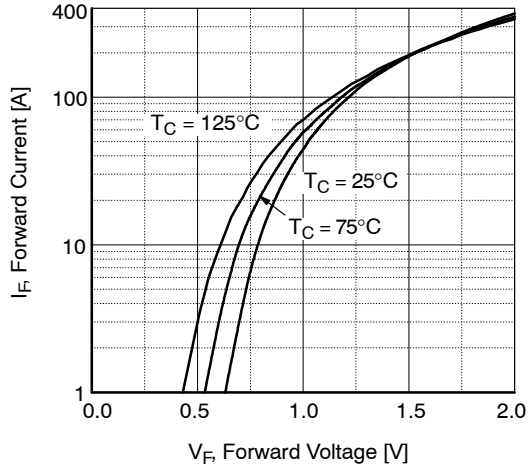


Figure 3. Typical Forward Voltage Drop vs. Forward Current

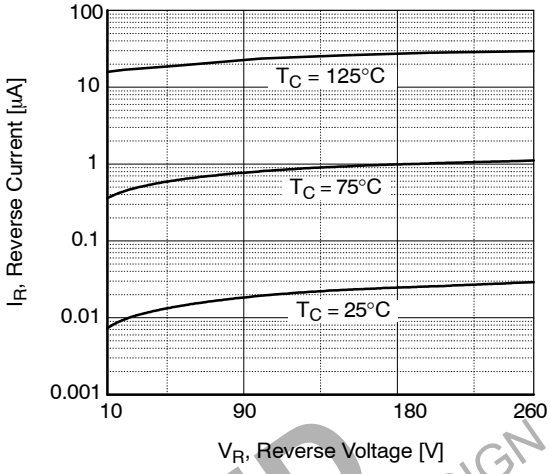


Figure 4. Typical Reverse Current vs. Reverse Voltage

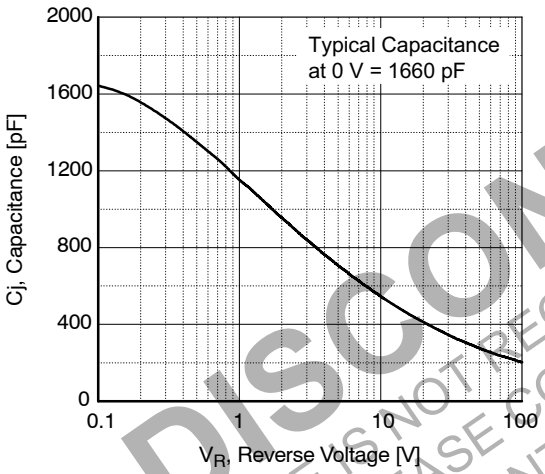


Figure 5. Typical Junction Capacitance

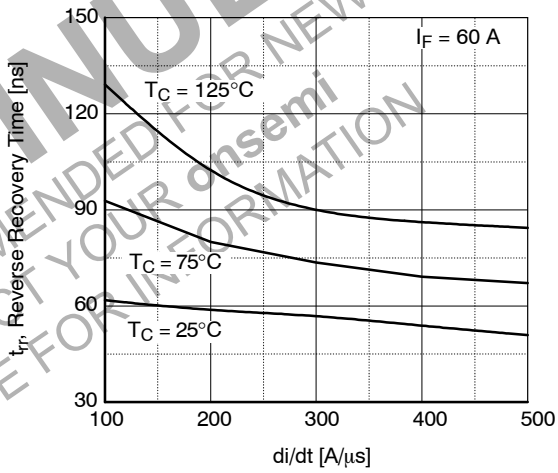


Figure 6. Typical Reverse Recovery Time vs. di/dt

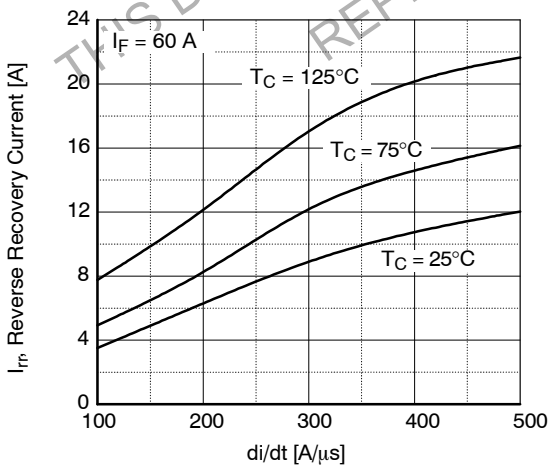


Figure 7. Typical Reverse Recovery Current vs. di/dt

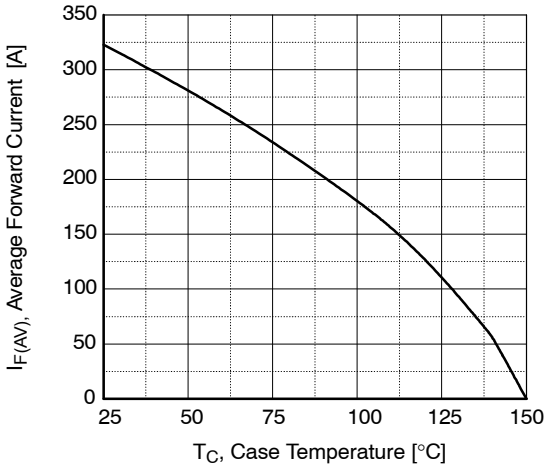


Figure 8. Forward Current Derating Curve

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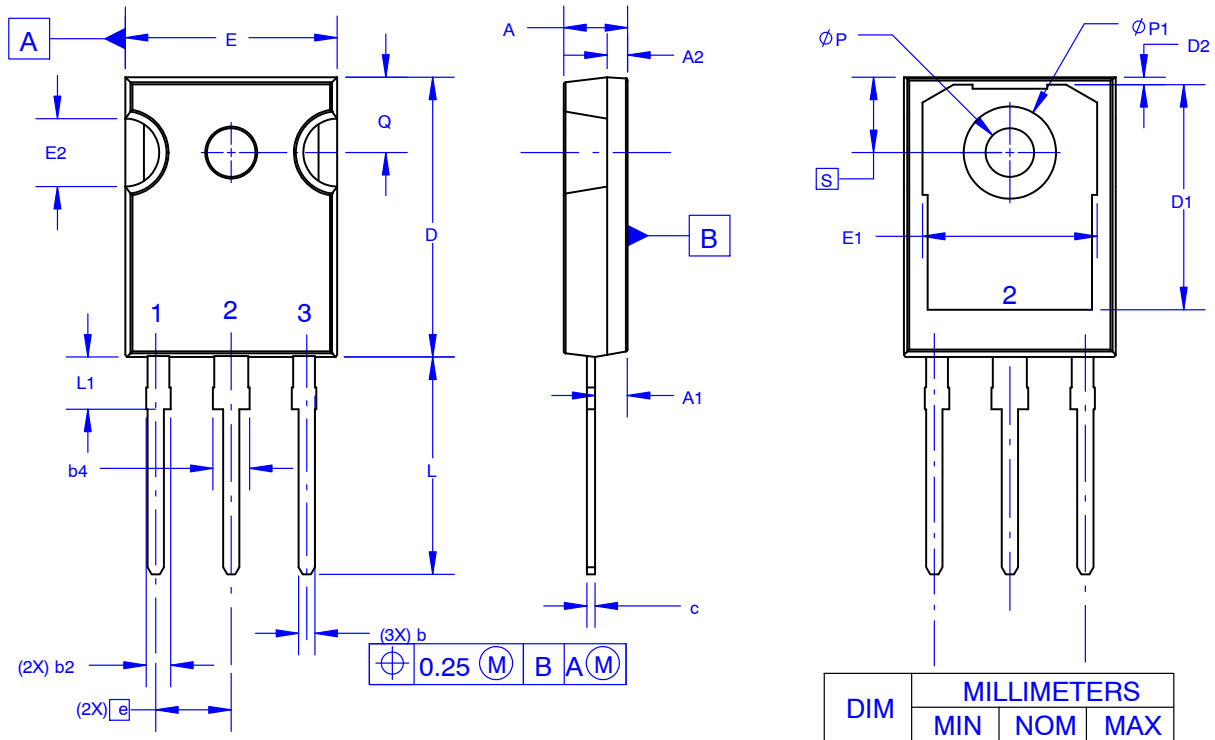
DATE 31 JAN 2019

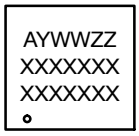


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	5.56	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
ØP1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

NOTES: UNLESS OTHERWISE SPECIFIED.

A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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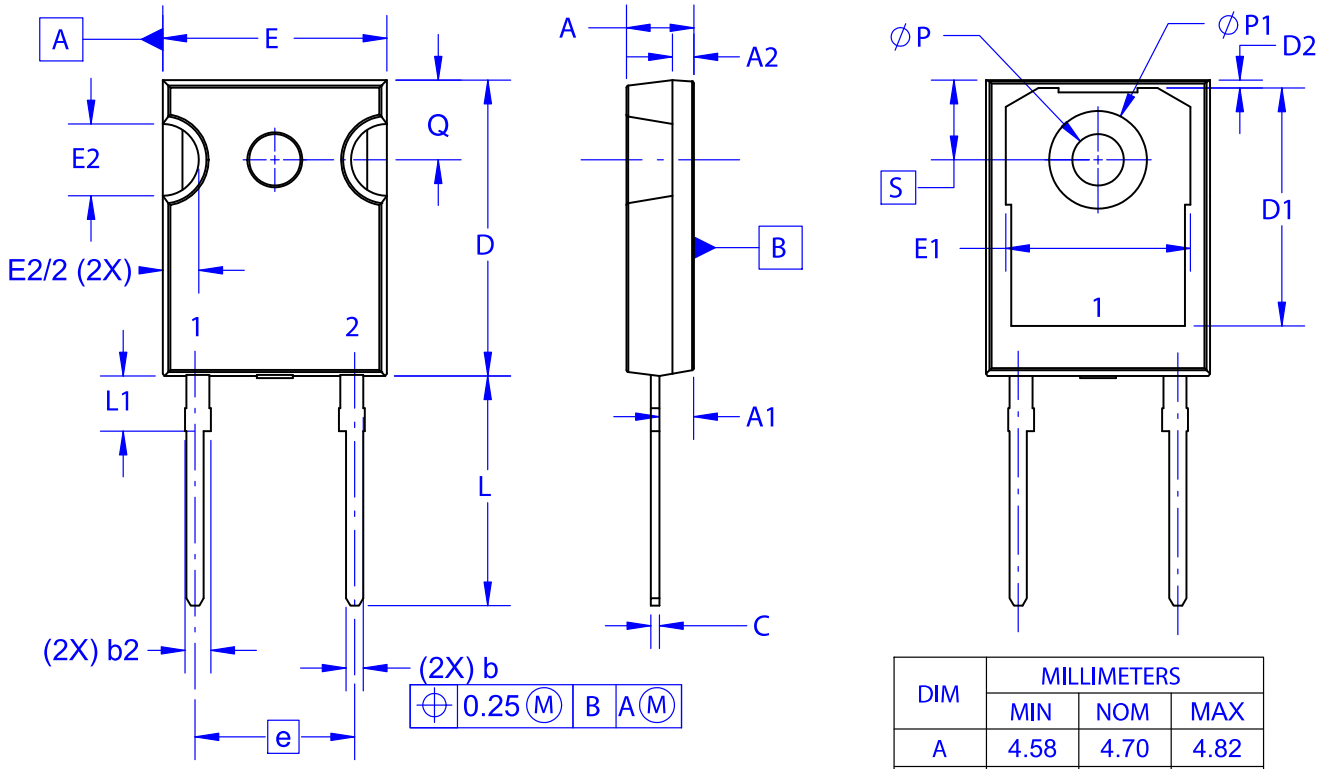
DATE 03 DEC 2019



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b2	1.53	1.65	1.77
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	16.37	16.57	16.77
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	11.12	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
ØP1	6.61	6.73	6.85
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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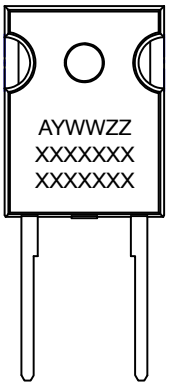

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