STEALTH™ Diode
50 A, 600 V

FFH50US60S

Description

The FFH50US60S is a STEALTH™ diode optimized for low loss performance in output rectification. The STEALTH family exhibits low reverse recovery current (I_{RR}), low V_F and soft recovery under typical operating conditions. This device is intended for use as an output rectification diode in Telecom power supplies and other power switching applications. Lower V_F and I_{RR} reduces diode losses.

Features

- Stealth Recovery, t_{rr} = 113 ns (@ I_F = 50 A)
- Max Forward Voltage, V_F = 1.54 V (@ T_C = 25°C)
- 600 V Reverse Voltage and High Reliability
- Operating Temperature = 175°C
- Avalanche Energy Rated
- This Device is Pb−Free and is RoHS Compliant

Applications

- SMPS, Welders
- Power Factor Correction
- Uninterruptible Power Supplies
- Motor Drives

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

Rating	Symbol	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	600	V
Working Peak Reverse Voltage	V_{RWM}	600	V
DC Blocking Voltage	V_R	600	V
Average Rectified Forward Current (T_C = 120°C)	$I_{F(AV)}$	50	A
Repetitive Peak Surge Current (20 kHz Square Wave)	I_{FRM}	100	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60 Hz)	I_{FSM}	500	A
Power Dissipation	P_D	200	W
Avalanche Energy (1 A, 40 mH)	E_{AVL}	20	mJ
Operating and Storage Temperature Range	T_J, T_{STG}	−55 to 175	°C
Maximum Temperature for Soldering Leads at 0.063 in (1.6 mm) from Case for 10 s	T_L	300	°C
Maximum Temperature for Soldering Package Body for 10 s	T_{PKG}	260	°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.

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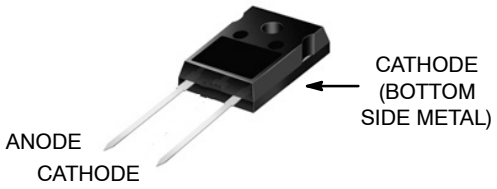
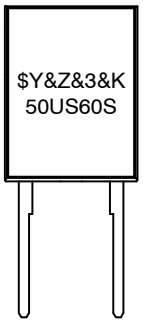


TO−247
JEDEC STYLE
2 LEAD
CASE 340 CL

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
50US60S	= Specific Device Code

ORDERING INFORMATION

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

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Packing Methode	Reel Size	Tape Width	Quantity
FFH50US60S	FFH50US60S	TO247−2L	Tube	N/A	N/A	30

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

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
OFF STATE CHARACTERISTICS							
I_R	Instantaneous Reverse Current	V_R = 600 V	T_C = 25°C	–	–	100	μA
			T_C = 125°C	–	–	1	mA
ON CHARACTERISTICS							
V_F	Instantaneous Forward Voltage	I_F = 50 A	T_C = 25°C	–	1.38	1.54	V
			T_C = 125°C	–	1.37	1.53	V
DYNAMIC CHARACTERISTICS							
C_J	Junction Capacitance	V_R = 10 V, I_F = 0 A		–	110	–	pF
SWITCHING CHARACTERISTICS							
T_{rr}	Reverse Recovery Time	I_F = 1 A, dI_F/dt = 100 A/μs, V_R = 15 V		–	47	80	ns
		I_F = 50 A, dI_F/dt = 100 A/μs, V_R = 15 V		–	75	124	ns
T_{rr}	Reverse Recovery Time	I_F = 50 A, dI_F/dt = 200 A/μs, V_R = 390 V, T_C = 25°C		–	113	–	ns
I_{RR}	Reverse Recovery Current			–	9.6	–	A
Q_{RR}	Reverse Recovered Charge			–	0.9	–	μC
T_{rr}	Reverse Recovery Time	I_F = 50 A, dI_F/dt = 200 A/μs, V_R = 390 V, T_C = 125°C		–	235	–	ns
S	Softness Factor (t_b/t_a)			–	1.5	–	–
I_{RR}	Reverse Recovery Current			–	15	–	A
Q_{RR}	Reverse Recovered Charge			–	2.3	–	μC
T_{rr}	Reverse Recovery Time	I_F = 50 A, dI_F/dt = 1000 A/μs, V_R = 390 V, T_C = 125°C		–	110	–	ns
S	Softness Factor (t_b/t_a)			–	0.8	–	–
I_{RR}	Reverse Recovery Current			–	46	–	A
Q_{RR}	Reverse Recovered Charge			–	3.1	–	μC
dI_M/dt	Maximum di/dt during t_b			–	1000	–	A/μs
THERMAL CHARACTERISTICS							
$R_{\theta JC}$	Thermal Resistance Junction to Case			–	–	0.75	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	TO−247		–	–	30	°C/W

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.

TYPICAL PERFORMANCE CURVES

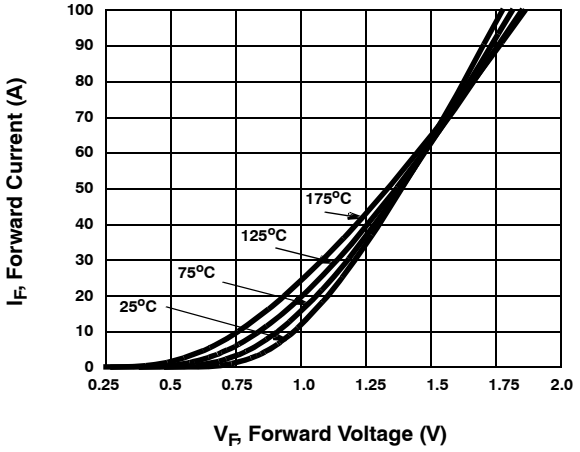


Figure 1. Forward Current vs. Forward Voltage

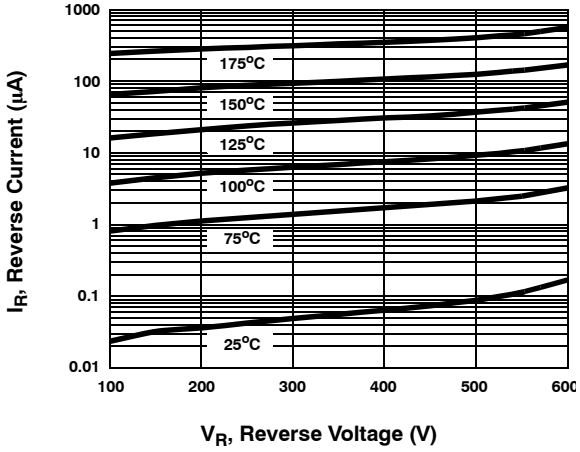


Figure 2. Reverse Current vs. Reverse Voltage

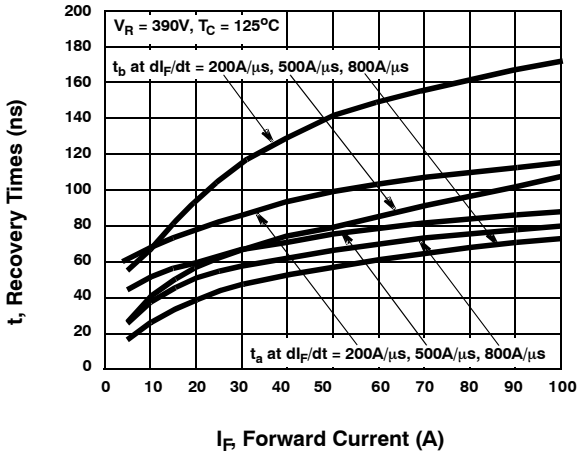


Figure 3. t_a and t_b Curves vs. Forward Current

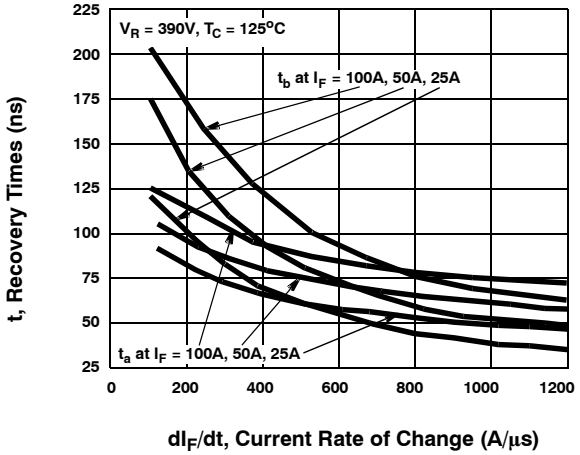


Figure 4. t_a and t_b Curves vs. dI_F/dt

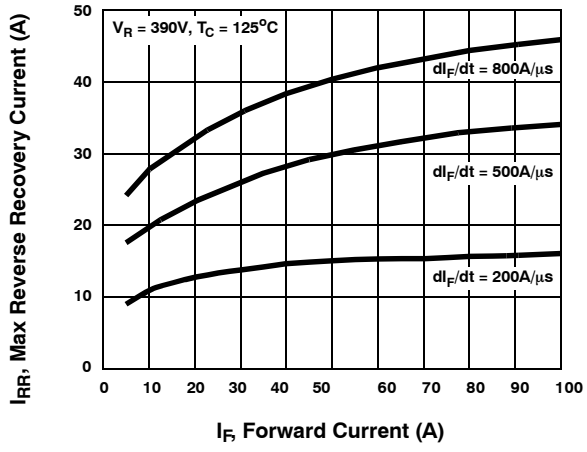


Figure 5. Maximum Reverse Recovery Current vs. Forward Current

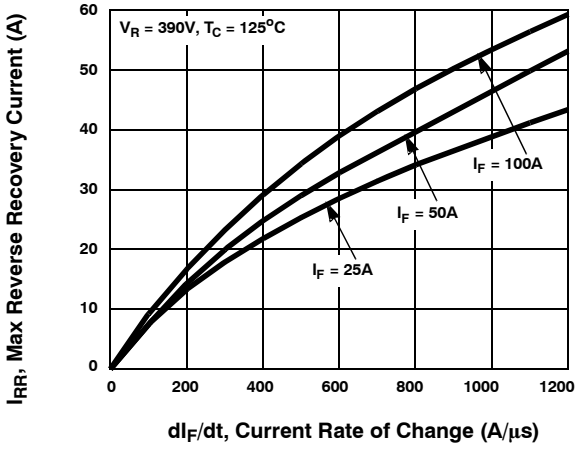


Figure 6. Maximum Reverse Recovery Current vs. dI_F/dt

TYPICAL PERFORMANCE CURVES

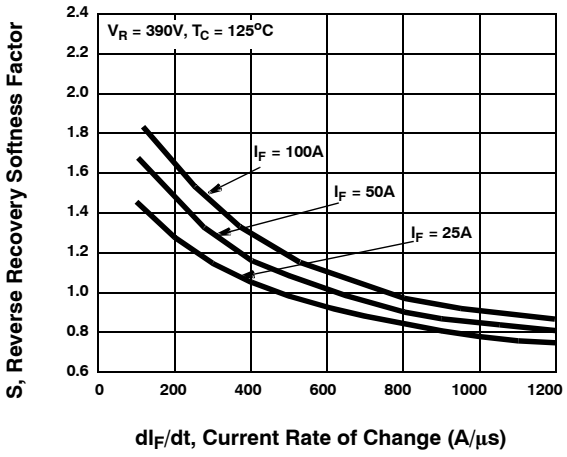


Figure 7. Reverse Recovery Softness Factor vs. dI_F/dt

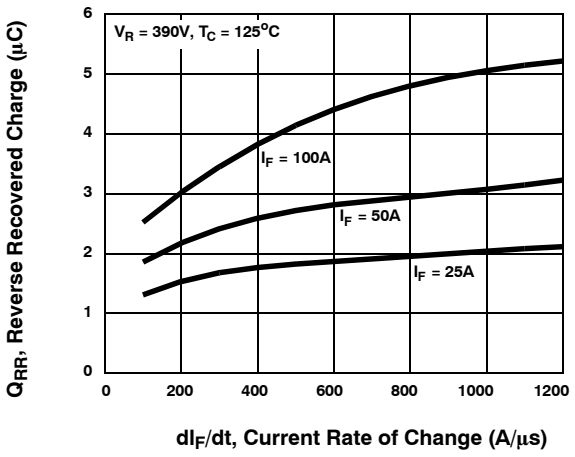


Figure 8. Reverse Recovery Charge vs. dI_F/dt

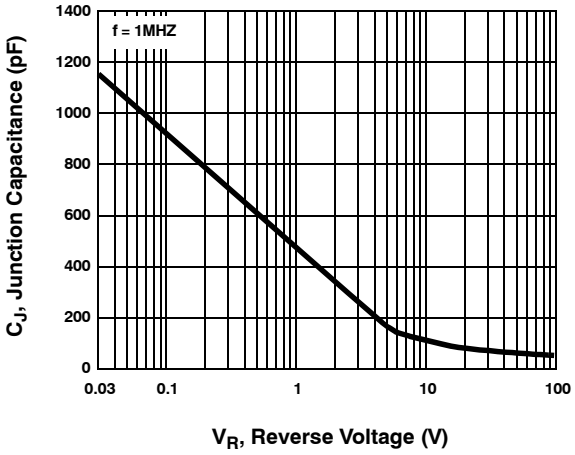


Figure 9. Junction Capacitance vs. Reverse Voltage

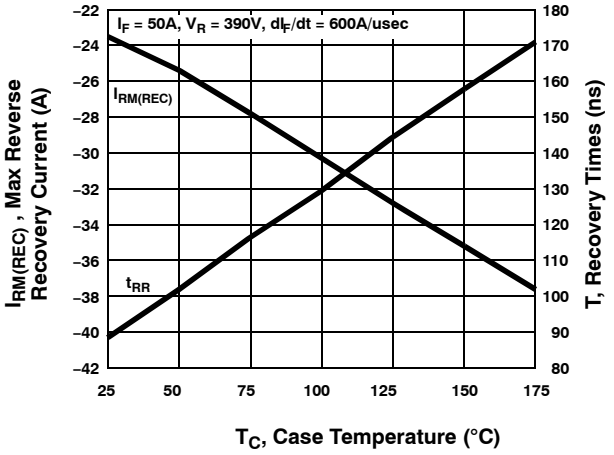


Figure 10. Maximum Reverse Recovery Current and t_{rr} vs. Case Temperature

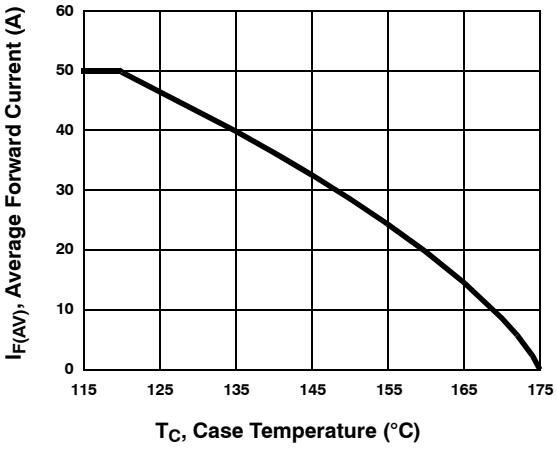


Figure 11. DC Current Derating Curve

TYPICAL PERFORMANCE CURVES

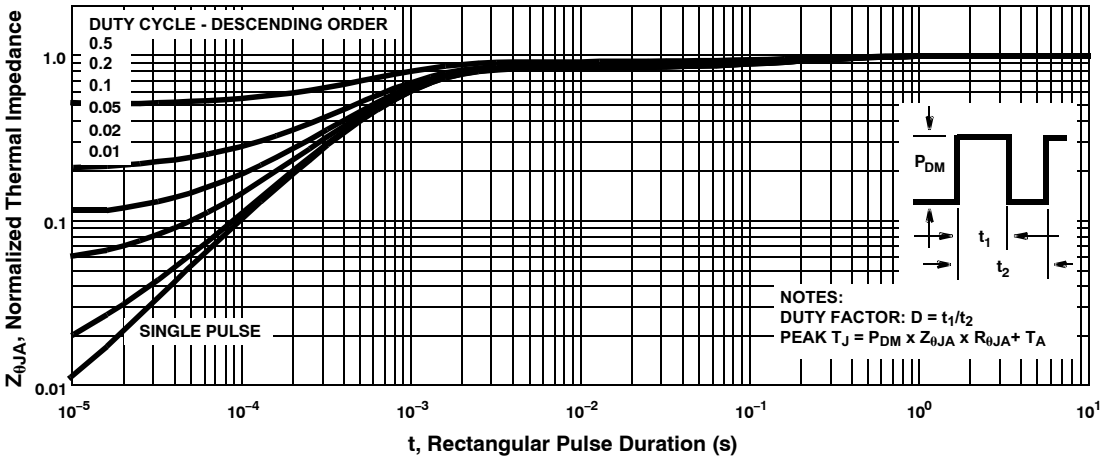


Figure 12. Normalized Maximum Transient Thermal Impedance

TEST CIRCUITS AND WAVEFORMS

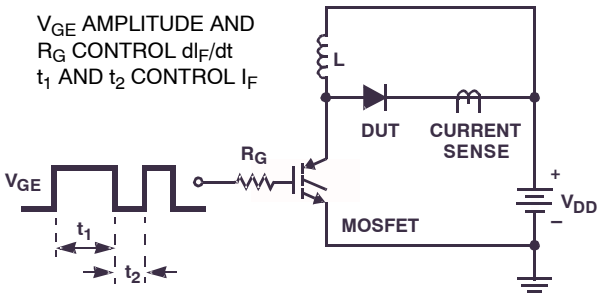


Figure 13. T_{rr} Test Circuit

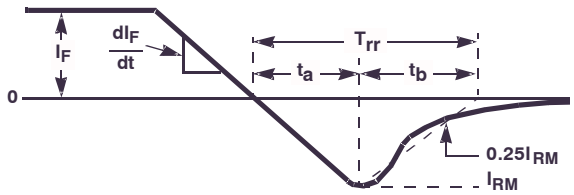


Figure 14. T_{rr} Waveforms and Definitions

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

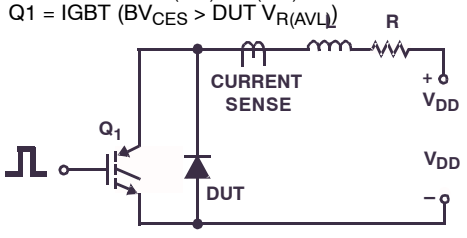


Figure 15. Avalanche Energy Test Circuit

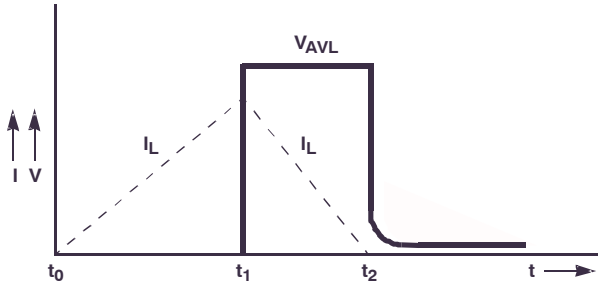


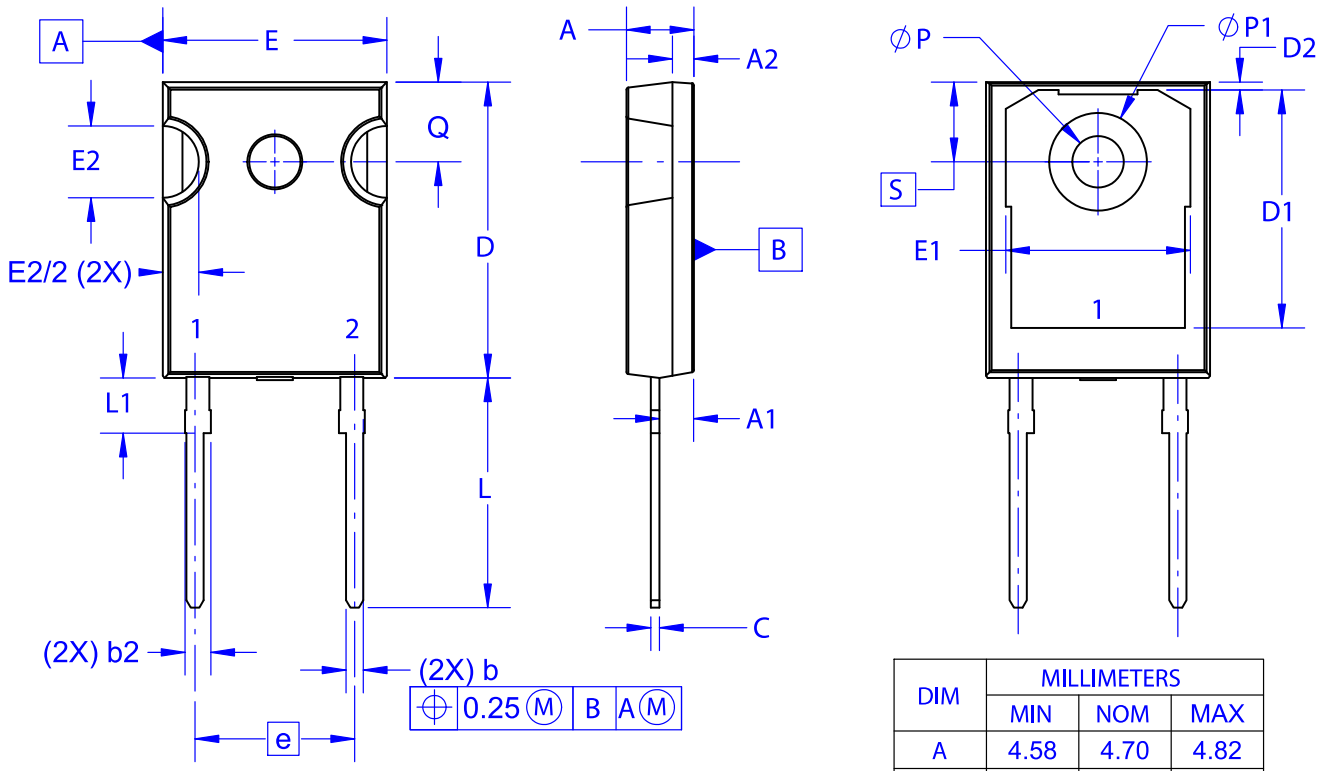
Figure 16. Avalanche Current and Voltage Waveforms

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

TO−247−2LD
CASE 340CL
ISSUE A

DATE 03 DEC 2019

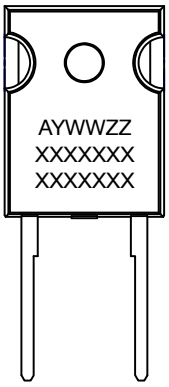


NOTES: UNLESS OTHERWISE SPECIFIED.

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.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.29	2.40	2.66
A2	1.30	1.50	1.70
b	1.17	1.26	1.35
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

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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