STEALTH™ Diode

30 A, 1200 V

ISL9R30120G2

ON Semiconductor®

www.onsemi.com

Description

The ISL9R30120G2 is a STEALTH diode optimized for low loss performance in high frequency hard switched applications. The STEALTH family exhibits low reverse recovery current (I_{RR}) and exceptionally soft recovery under typical operating conditions.

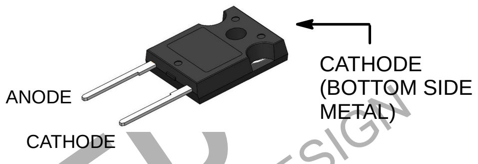
This device is intended for use as a free wheeling or boost diode in power supplies and other power switching applications. The low I_{RR} and short ta phase reduce loss in switching transistors. The soft recovery minimizes ringing, expanding the range of conditions under which the diode may be operated without the use of additional snubber circuitry. Consider using the STEALTH diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

Features

- Stealth Recovery t_{rr} = 269 ns (@ I_F = 30 A)
- Max Forward Voltage, V_F = 3.3 V (@ T_C = 25°C)
- 1200 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- This Device is Pb−Free and is RoHS Compliant

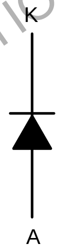
Applications

- Switch Mode Power Supplies
- Hard Switched PFC Boost Diode
- UPS Free Wheeling Diode
- Motor Drive FWD
- SMPS FWD
- Snubber Diode

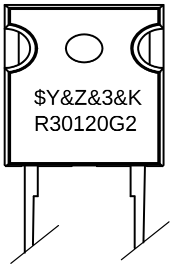


TO−247−2LD
CASE 340CL

SYMBOL



MARKING DIAGRAM



$Y = ON Semiconductor Logo
&Z = Assembly Plant Code
&3 = Numeric Date Code
&K = Lot Code
R30120G2 = Specific Device Code

ORDERING INFORMATION

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

February, 2025 − Rev. 4

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

Characteristic	Symbol	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	1200	V
Working Peak Reverse Voltage	V_{RWM}	1200	V
DC Blocking Voltage	V_R	1200	V
Average Rectified Forward Current (T_C = 80°C)	$I_{F(AV)}$	30	A
Repetitive Peak Surge Current (20 kHz Square Wave)	I_{FRM}	70	A
Non−repetitive Peak Surge Current (Halfwave 1 Phase 60 Hz)	I_{FSM}	325	A
Power Dissipation	P_D	166	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 Package Body for 10 s	 T_L T_{PKG}	 300 260	 °C °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.

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Packing Method	Tape Width	Quantity
ISL9R30120G2	R30120G2	TO−247−2LD	Tube	N/A	30

THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.75	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	30	°C/W

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

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Off State Characteristics							
Instantaneous Reverse Current	I_R	V_R =1200 V	T_C = 25°C	−	−	100	μA
			T_C = 125°C	−	−	1.0	mA
On State Characteristics							
Instantaneous Forward Voltage	V_F	I_F = 30 A	T_C = 25°C	−	2.8	3.3	V
			T_C = 125°C	−	2.6	3.1	V
Dynamic Characteristics							
Junction Capacitance	C_J	V_R = 10 V, I_F = 0 A		−	115	−	pF
Switching Characteristics							
Reverse Recovery Time	t_{rr}	I_F = 1 A, dI/dt = 100 A/μs, V_R = 15 V		−	45	56	ns
		I_F = 30 A, dI/dt = 100 A/μs, V_R = 15 V		−	80	100	ns
Reverse Recovery Time	t_{rr}	I_F = 30 A, dI_F/dt = 200 A/μs, V_R = 780 V, T_C = 25°C		−	269	−	ns
Reverse Recovery Current	I_{rr}			−	7.5	−	A
Reverse Recovered Charge	Q_{rr}			−	930	−	nC
Reverse Recovery Time	t_{rr}	I_F = 30 A, dI_F/dt = 200 A/μs, V_R = 780 V, T_C = 125°C		−	529	−	ns
Softness Factor (t_b/t_a)	S			−	6.2	−	−
Reverse Recovery Current	I_{rr}			−	11	−	A
Reverse Recovered Charge	Q_{rr}			−	3.0	−	μC
Reverse Recovery Time	t_{rr}	I_F = 30 A, dI_F/dt = 1000 A/μs, V_R = 780 V, T_C = 125°C		−	260	−	ns
Softness Factor (t_b/t_a)	S			−	4.8	−	−
Reverse Recovery Current	I_{rr}			−	30	−	A
Reverse Recovered Charge	Q_{rr}			−	3.4	−	μC
Maximum di/dt During t_b	dI_M/dt			−	520	−	A/μs

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

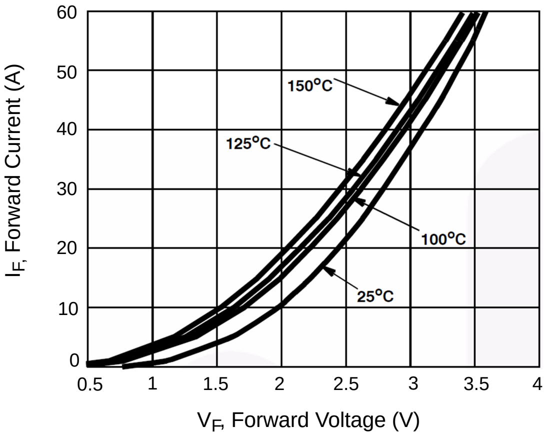


Figure 1. Forward Current vs. Forward Voltage

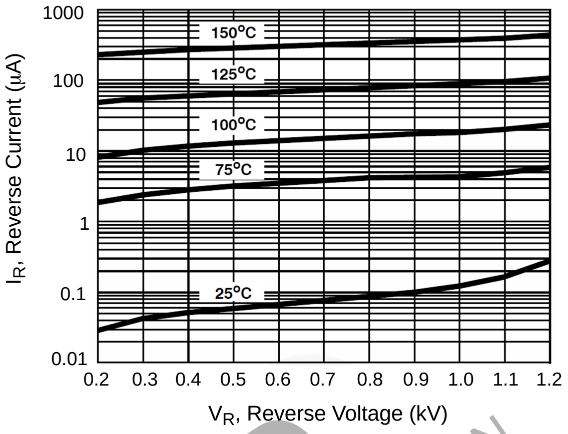


Figure 2. Reverse Current vs. Reverse Voltage

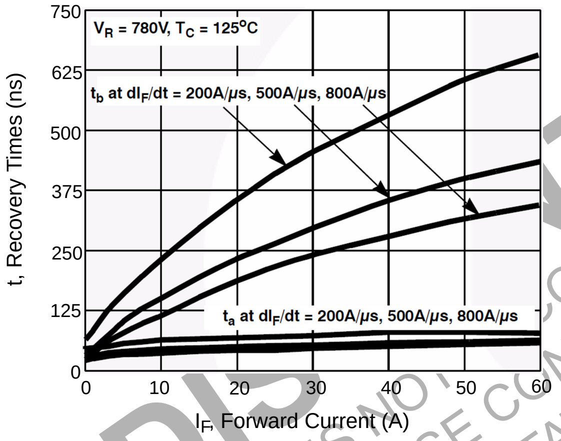


Figure 3. t_a and t_b Curves vs. Forward Current

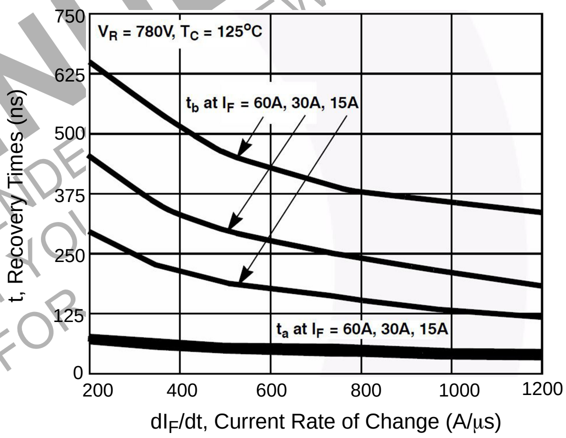


Figure 4. t_a and t_b Curves vs. dI_F/dt

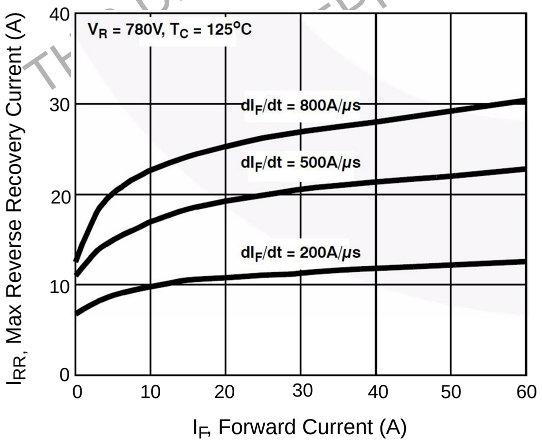


Figure 5. Maximum Reverse Recovery Current vs. Forward Current

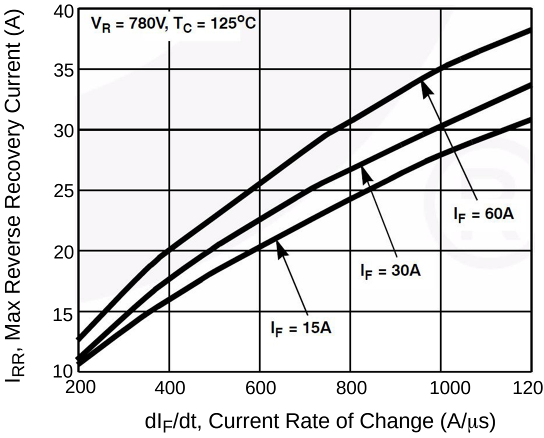


Figure 6. Maximum Reverse Recovery Current vs. dI_F/dt

TYPICAL PERFORMANCE CURVES (continued)

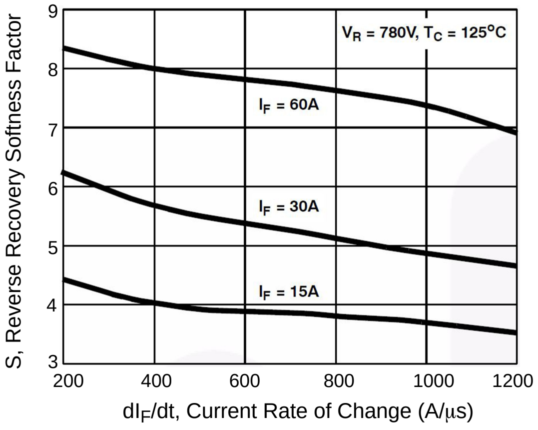


Figure 7. Reverse Recovery Softness Factor vs. dI$_F$/dt

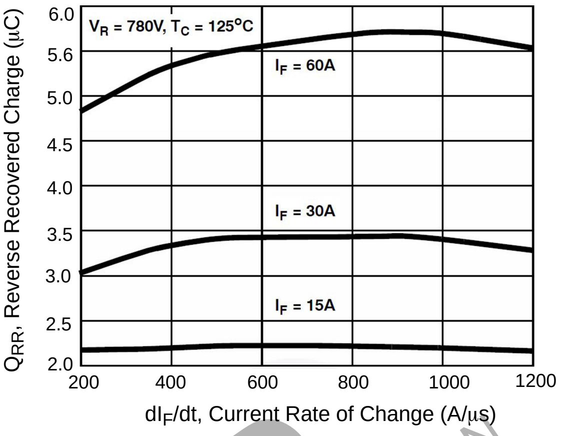


Figure 8. Reverse Recovery Charge vs. dI$_F$/dt

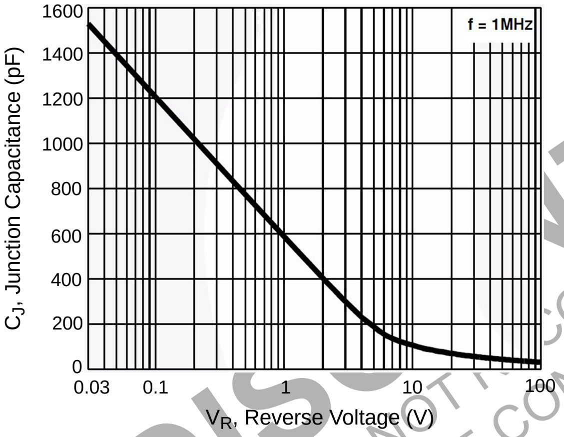


Figure 9. Junction Capacitance vs. Reverse Voltage

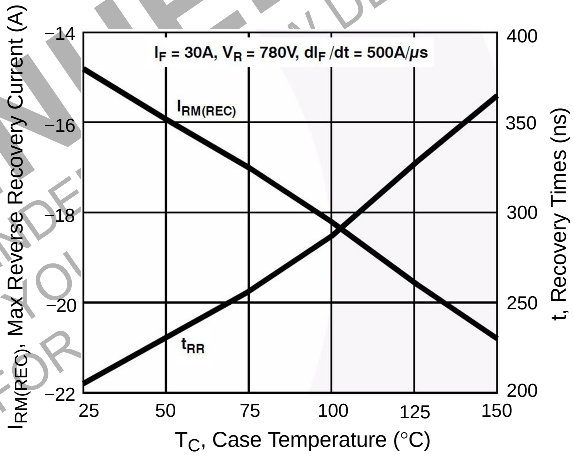


Figure 10. Maximum Reverse Recovery Current and t$_{rr}$ vs. Case Temperature

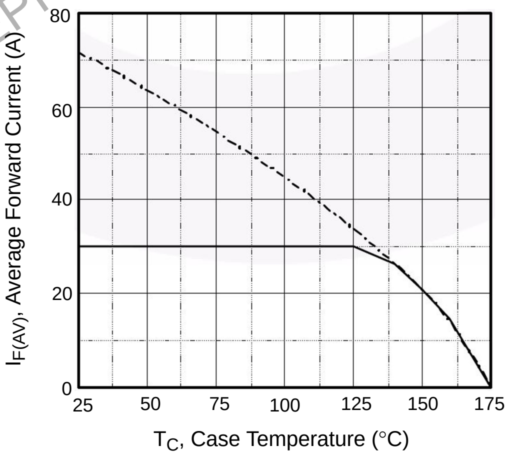


Figure 11. DC Current Derating Curve

TYPICAL PERFORMANCE CURVES (continued)

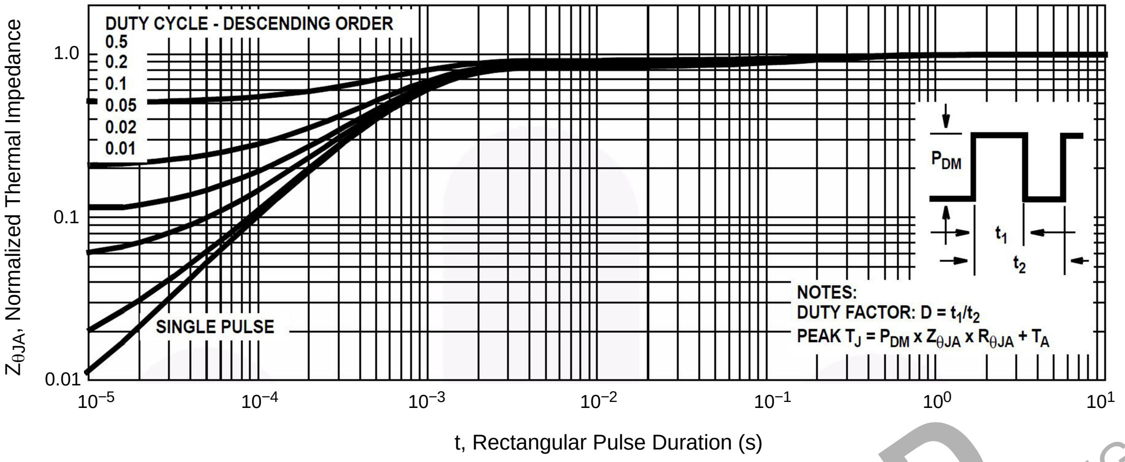


Figure 12. Normalized Maximum Transient Thermal Impedance

TEST CIRCUIT AND WAVEFORMS

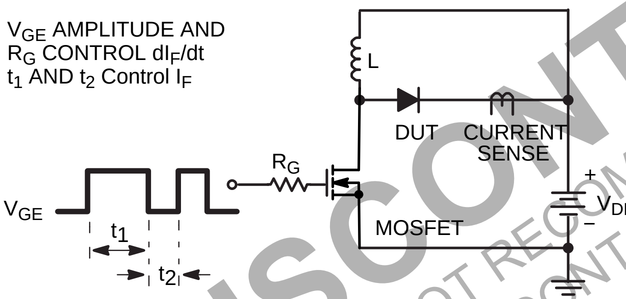


Figure 13. t_{rr} Test Circuit

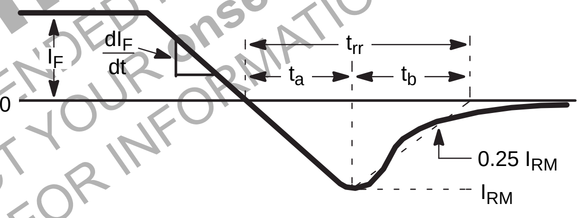


Figure 14. t_{rr} Waveforms and Definitions

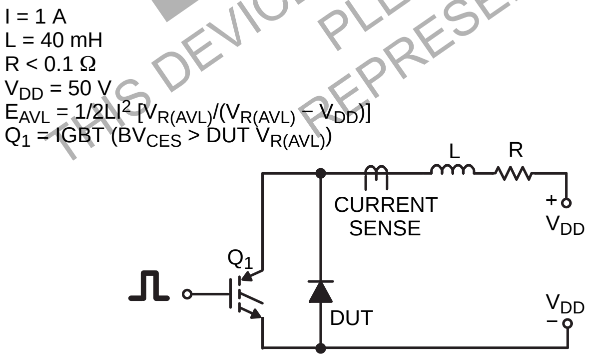


Figure 15. Avalanche Energy Test Circuit

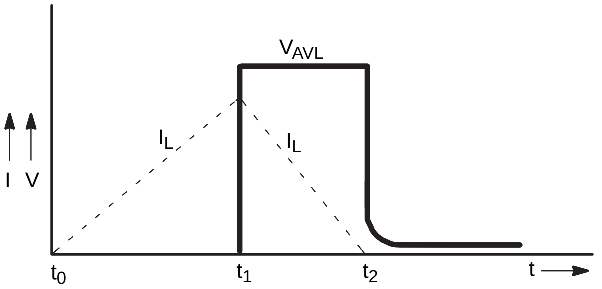


Figure 16. Avalanche Current and Voltage Waveforms

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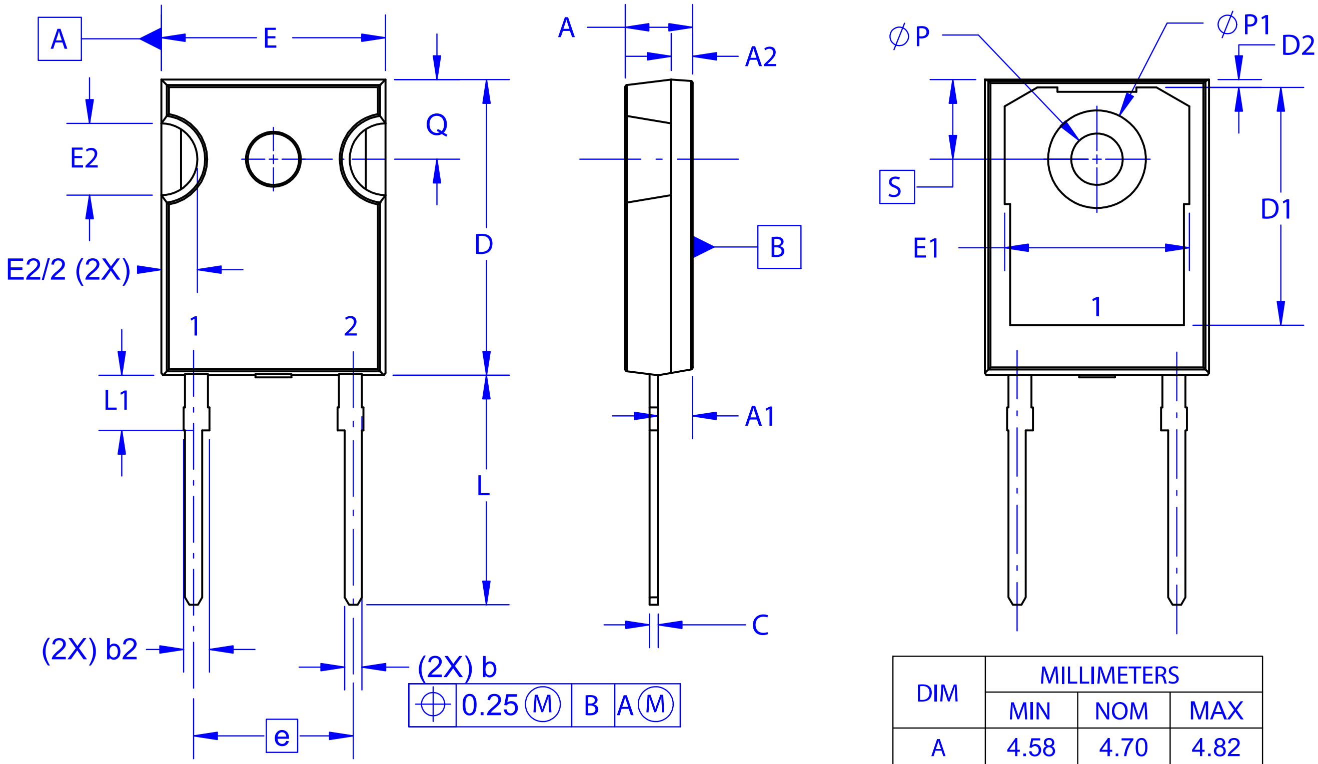
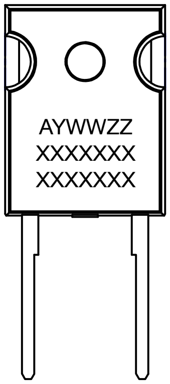


NOTES: UNLESS OTHERWISE SPECIFIED.

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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