

STEALTH Diode

30 A, 300 V

FFH30US30DN

Description

The FFH30US30DN is a STEALTH™ diode optimized for low loss performance in output rectification. The STEALTH family exhibits low reverse recovery current ($I_{RM(REC)}$), 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 $I_{RM(REC)}$ reduces diode losses.

Formerly developmental type TA49449.

Features

- Soft Recovery $t_b/t_a > 0.45$
- Fast Recovery $t_{rr} < 50$ ns
- High Operating Temperature 175°C
- Reverse Voltage 300 V
- Avalanche Energy Rating 20 mJ
- This is a Pb-Free Device

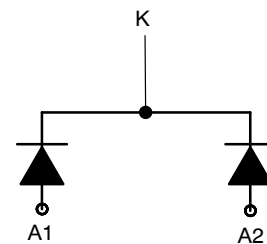
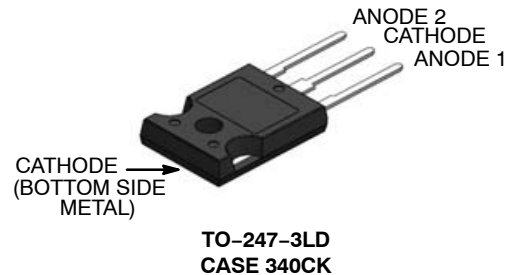
Applications

- Switch Mode Power Supplies
- Power Factor Correction
- Uninterruptable Power Supplies
- Motor Drives
- Welders

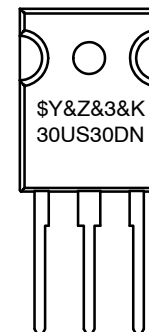


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MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
30US30DN	= Specific Device Code

ORDERING INFORMATION

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

FFH30US30DN

DEVICE MAXIMUM RATINGS (per leg) ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	300	V
Working Peak Reverse Voltage	V_{RWM}	300	V
DC Blocking Voltage	V_R	300	V
Average Rectified Forward Current ($T_C = 160^\circ\text{C}$)	$I_{F(AV)}$	30	A
Total Device Current (Both Legs)		60	
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	230	W
Avalanche Energy (1 A, 40 mH)	E_{AVL}	20	mJ
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$
Maximum Temperature for Soldering Leads at 0.063in (1.6 mm) from Case for 10 s Package Body for 10 s, See Application Note AN-7528	T_L T_{PKG}	300 260	$^\circ\text{C}$ $^\circ\text{C}$

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.

THERMAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.65	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	30	$^\circ\text{C}/\text{W}$

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Tape Width	Quantity
FFH30US30DN	30US30DN	TO-247-3LD	N/A	30

FFH30US30DN

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF STATE CHARACTERISTICS

Instantaneous Reverse Current	I_R	$V_R = 300\text{ V}$	$T_C = 25^\circ\text{C}$	-	-	100	μA
			$T_C = 125^\circ\text{C}$	-	-	1	mA

ON STATE CHARACTERISTICS

Instantaneous Forward Voltage	V_F	$I_F = 30\text{ A}$	$T_C = 25^\circ\text{C}$	-	0.93	1.0	V
			$T_C = 125^\circ\text{C}$	-	0.8	0.87	

DYNAMIC CHARACTERISTICS

Junction Capacitance	C_J	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	410	-	pF
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SWITCHING CHARACTERISTICS

Reverse Recovery Time	t_{rr}	$I_F = 1\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}, V_R = 15\text{ V}$	-	29	50	ns
			$I_F = 30\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}, V_R = 15\text{ V}$	-	32	
Reverse Recovery Time	t_{rr}	$I_F = 30\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_R = 195\text{ V}, T_C = 25^\circ\text{C}$	-	46	-	ns
Maximum Reverse Recovery Current	$I_{RM(REC)}$		-	5.3	-	A
Reverse Recovered Charge	Q_{RR}		-	140	-	nC
Reverse Recovery Time	t_{rr}		-	77	-	ns
Softness Factor (t_b/t_a)	S	$I_F = 30\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_R = 195\text{ V}, T_C = 125^\circ\text{C}$	-	0.45	-	-
Maximum Reverse Recovery Current	$I_{RM(REC)}$		-	9	-	A
Reverse Recovered Charge	Q_{RR}		-	400	-	nC
Reverse Recovery Time	t_{rr}		-	54	-	ns
Softness Factor (t_b/t_a)	S	$I_F = 30\text{ A}, di_F/dt = 1000\text{ A}/\mu\text{s}, V_R = 195\text{ V}, T_C = 125^\circ\text{C}$	-	0.49	-	-
Maximum Reverse Recovery Current	$I_{RM(REC)}$		-	32	-	A
Reverse Recovered Charge	Q_{RR}		-	930	-	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.

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TYPICAL PERFORMANCE CURVES (per leg)

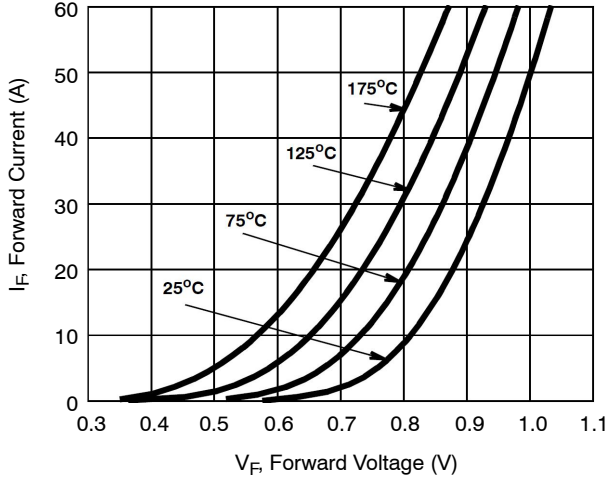


Figure 1. Forward Current vs. Forward Voltage

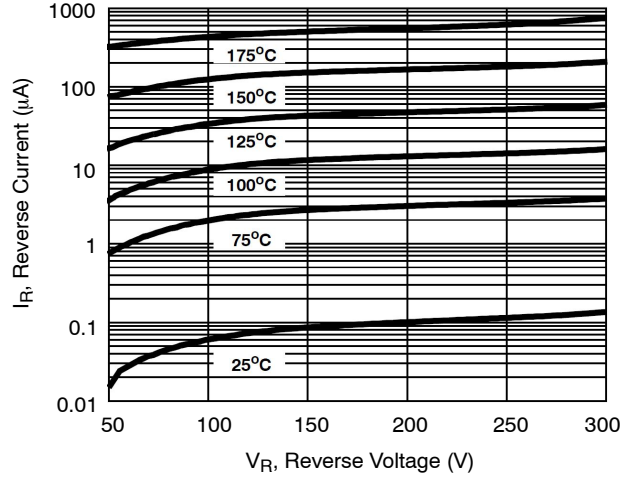


Figure 2. Reverse Current vs. Reverse Voltage

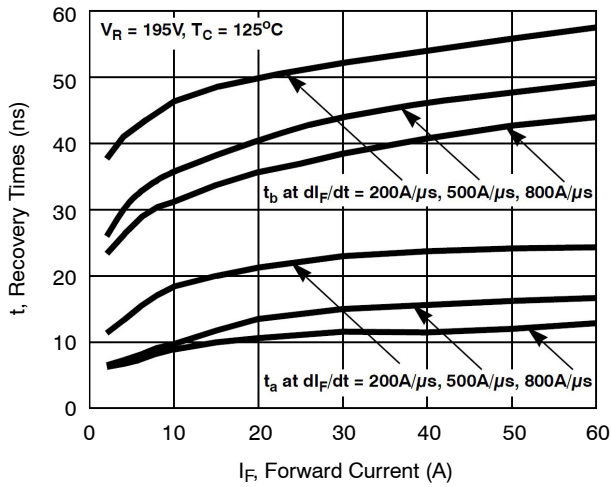


Figure 3. t_a and t_b Curves vs. Forward Current

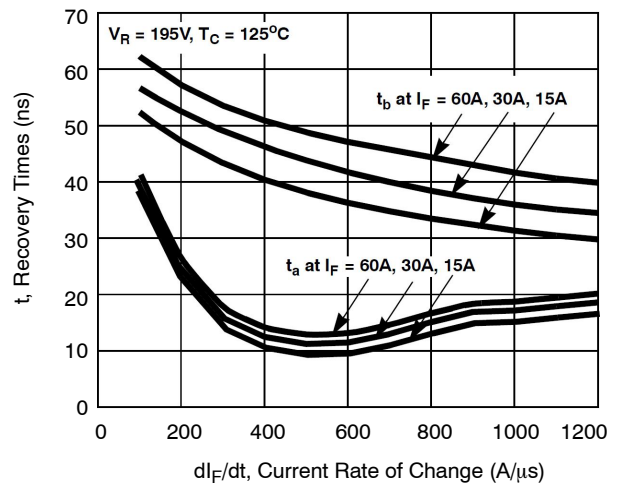


Figure 4. t_a and t_b Curves vs. di_F/dt

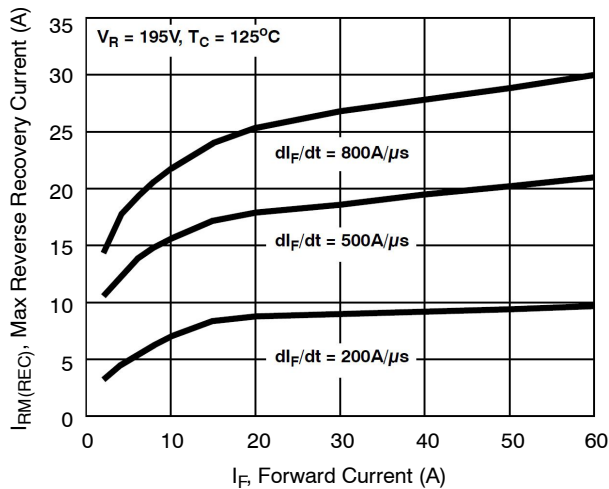


Figure 5. Maximum Reverse Recovery Current vs. Forward Current

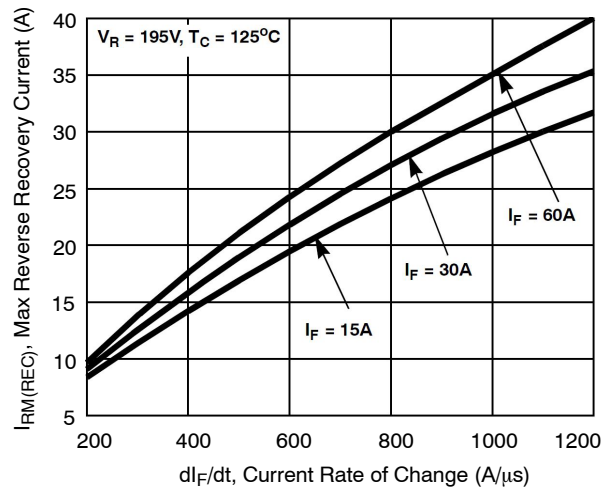


Figure 6. Maximum Reverse Recovery Current vs. di_F/dt

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TYPICAL PERFORMANCE CHARACTERISTICS (per leg) (continued)

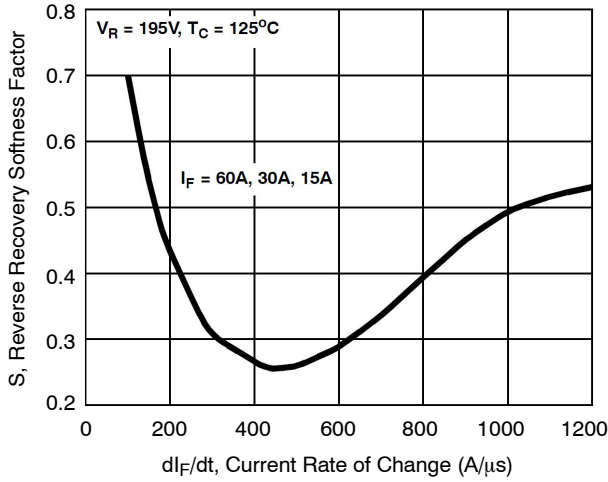


Figure 7. Reverse Recovery Softness Factor vs. di_F/dt

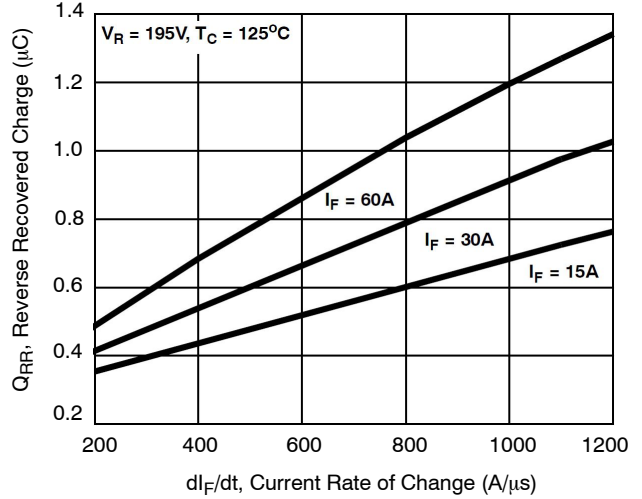


Figure 8. Reverse Recovery Charge vs. di_F/dt

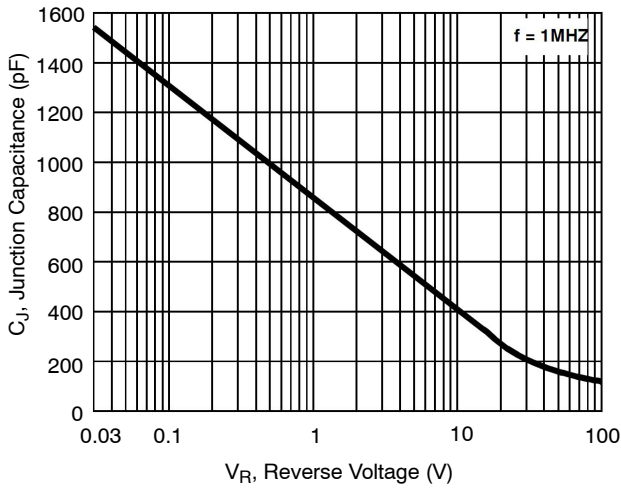


Figure 9. Junction Capacitance vs. Reverse Voltage

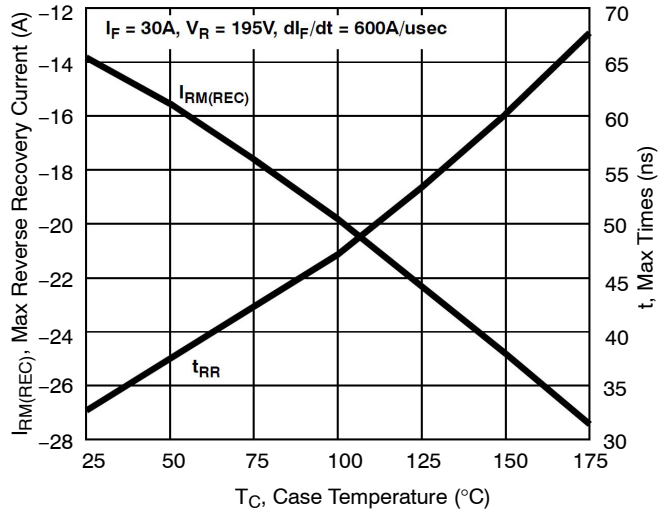


Figure 10. Maximum Reverse Recovery Current and t_{rr} vs. Case Temperature

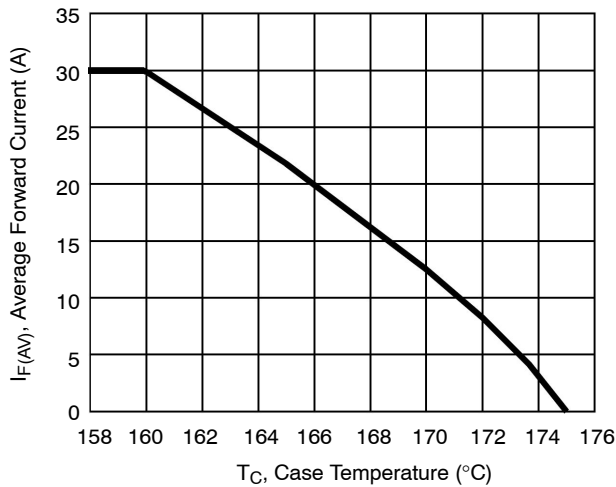


Figure 11. DC Current Derating Curve

TYPICAL PERFORMANCE CHARACTERISTICS (per leg) (continued)

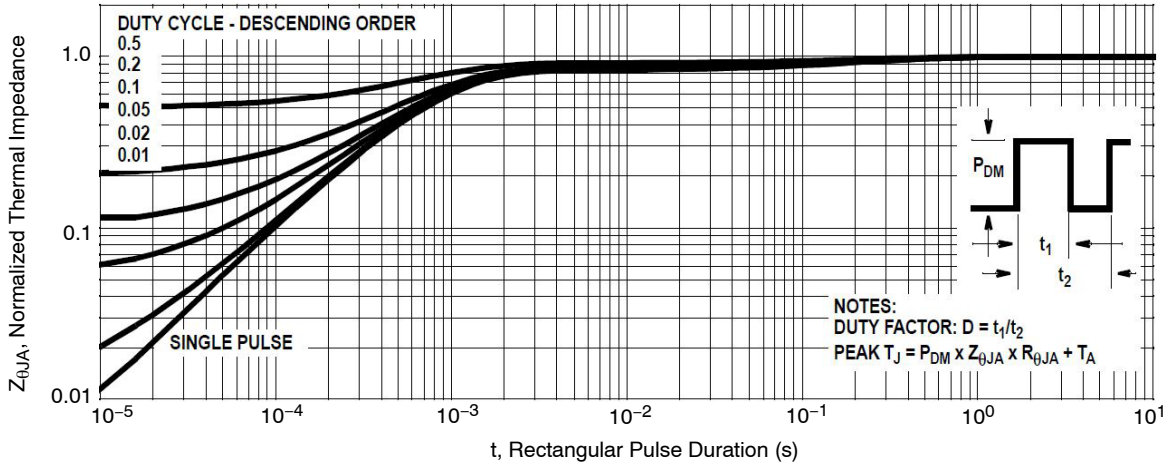


Figure 12. Normalized Maximum Transient Thermal Impedance

TEST CIRCUITS AND WAVEFORMS

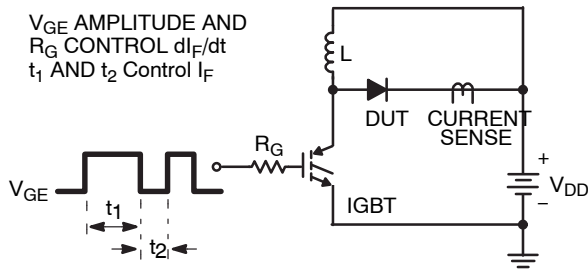


Figure 13. t_{rr} Test Circuit

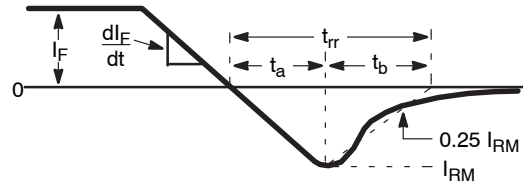


Figure 14. t_{rr} Waveforms and Definitions

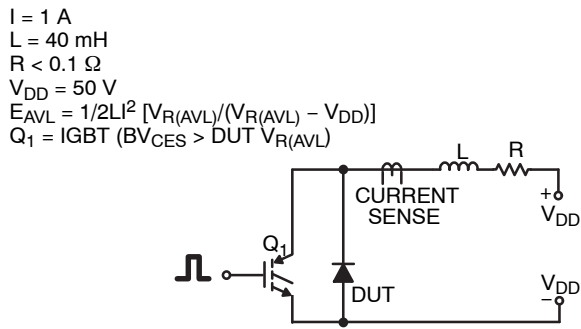


Figure 15. Avalanche Energy Test Circuit

$I = 1 \text{ A}$
 $L = 40 \text{ mH}$
 $R < 0.1 \Omega$
 $V_{DD} = 50 \text{ V}$
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
 $Q_1 = \text{IGBT (} BV_{CES} > \text{DUT } V_{R(AVL)} \text{)}$

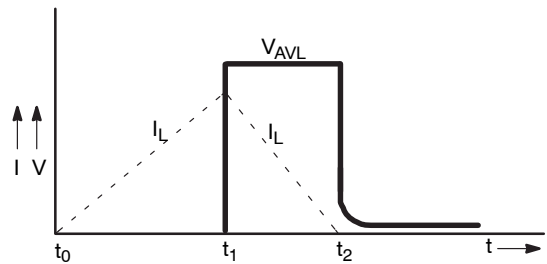
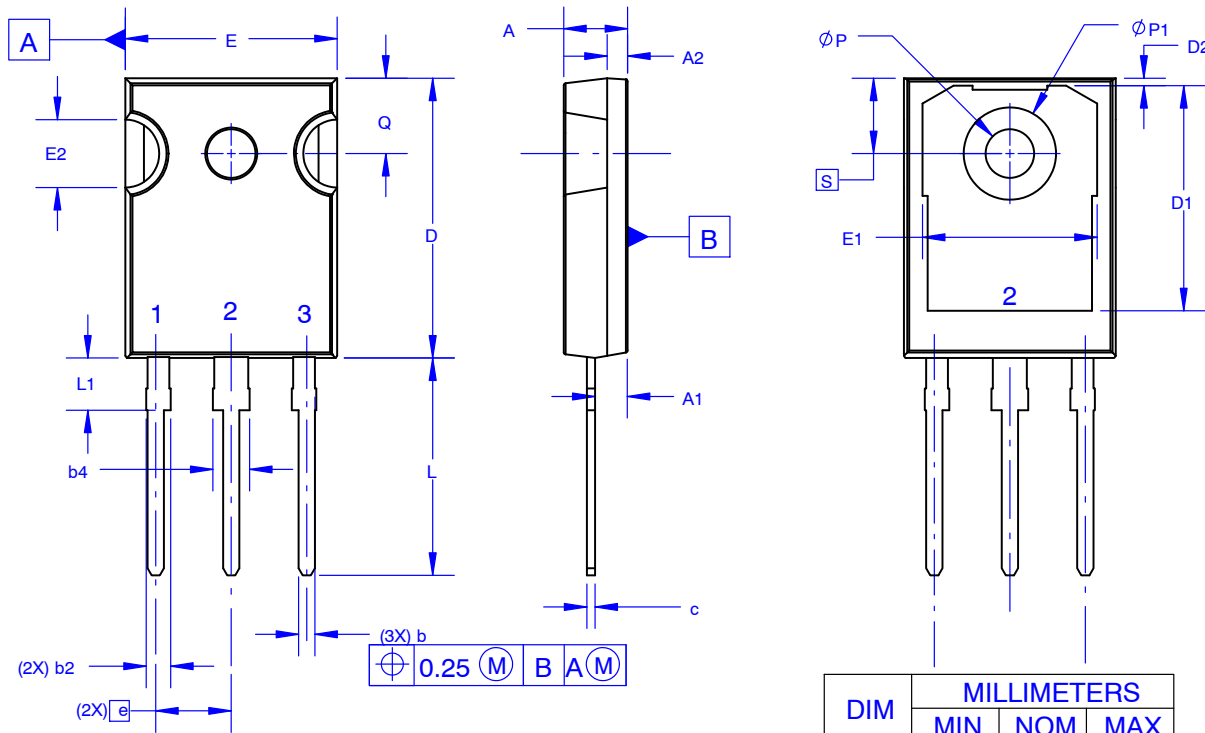


Figure 16. Avalanche Current and Voltage Waveforms

TO-247-3LD SHORT LEAD
CASE 340CK
ISSUE A

DATE 31 JAN 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.

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.

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

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