

# 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  $175^\circ\text{C}$
- Reverse Voltage 300 V
- Avalanche Energy Rating 20 mJ
- This is a Pb-Free Device

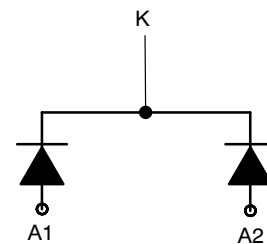
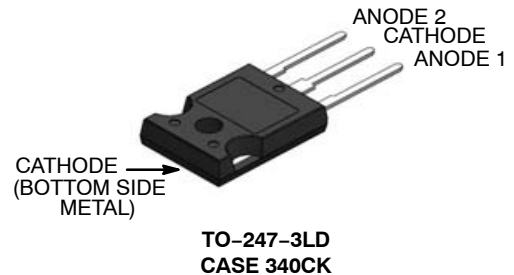
#### Applications

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

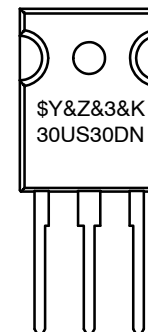


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#### MARKING DIAGRAM



\$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 <sub>R</sub>	V <sub>R</sub> = 300 V	T <sub>C</sub> = 25°C	-	-	100	μA
			T <sub>C</sub> = 125°C	-	-	1	mA

### ON STATE CHARACTERISTICS

Instantaneous Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 30 A	T <sub>C</sub> = 25°C	-	0.93	1.0	V
			T <sub>C</sub> = 125°C	-	0.8	0.87	

### DYNAMIC CHARACTERISTICS

Junction Capacitance	C <sub>J</sub>	V <sub>R</sub> = 10 V, I <sub>F</sub> = 0 A	-	410	-	pF
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### SWITCHING CHARACTERISTICS

Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 1 A, dI <sub>F</sub> /dt = 100 A/μs, V <sub>R</sub> = 15 V	-	29	50	ns
		I <sub>F</sub> = 30 A, dI <sub>F</sub> /dt = 100 A/μs, V <sub>R</sub> = 15 V	-	32	55	
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 30 A, dI <sub>F</sub> /dt = 200 A/μs, V <sub>R</sub> = 195 V, T <sub>C</sub> = 25°C	-	46	-	ns
Maximum Reverse Recovery Current	I <sub>RM(REC)</sub>		-	5.3	-	A
Reverse Recovered Charge	Q <sub>RR</sub>		-	140	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	77	-	ns
Softness Factor (t <sub>b</sub> /t <sub>a</sub> )	S	I <sub>F</sub> = 30 A, dI <sub>F</sub> /dt = 200 A/μs, V <sub>R</sub> = 195 V, T <sub>C</sub> = 125°C	-	0.45	-	-
Maximum Reverse Recovery Current	I <sub>RM(REC)</sub>		-	9	-	A
Reverse Recovered Charge	Q <sub>RR</sub>		-	400	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	54	-	ns
Softness Factor (t <sub>b</sub> /t <sub>a</sub> )	S	I <sub>F</sub> = 30 A, dI <sub>F</sub> /dt = 1000 A/μs, V <sub>R</sub> = 195 V, T <sub>C</sub> = 125°C	-	0.49	-	-
Maximum Reverse Recovery Current	I <sub>RM(REC)</sub>		-	32	-	A
Reverse Recovered Charge	Q <sub>RR</sub>		-	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.

# FFH30US30DN

## TYPICAL PERFORMANCE CURVES (per leg)

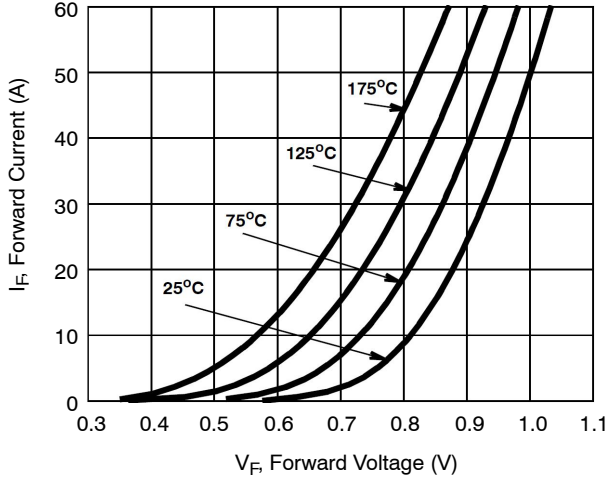


Figure 1. Forward Current vs. Forward Voltage

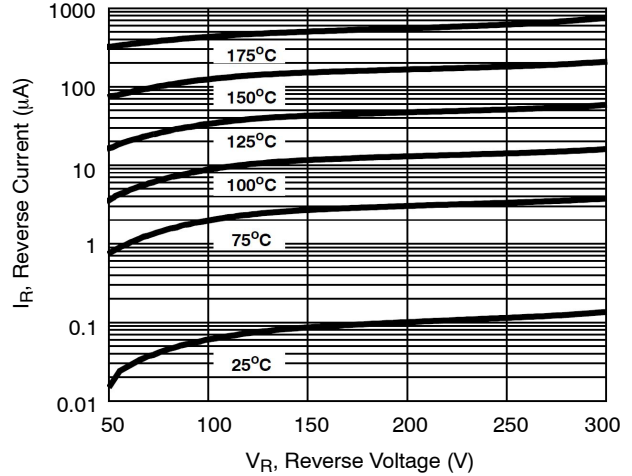


Figure 2. Reverse Current vs. Reverse Voltage

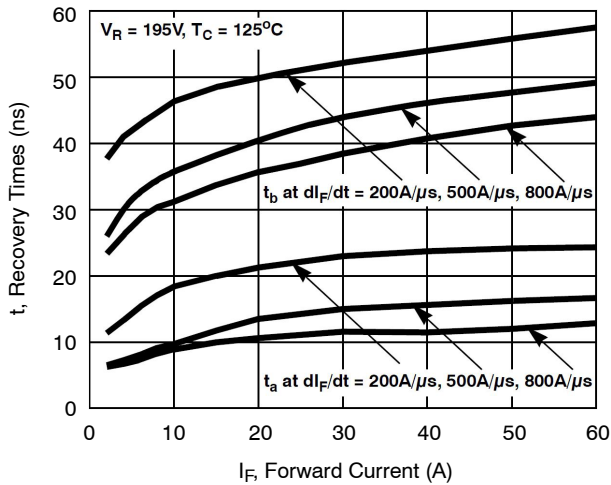


Figure 3.  $t_a$  and  $t_b$  Curves vs. Forward Current

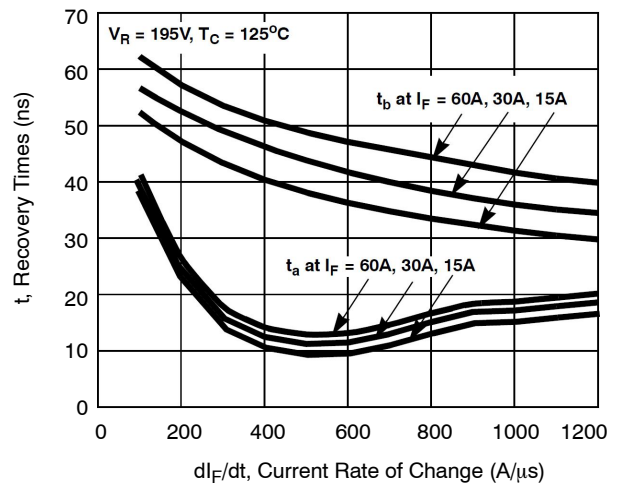


Figure 4.  $t_a$  and  $t_b$  Curves vs.  $di_F/dt$

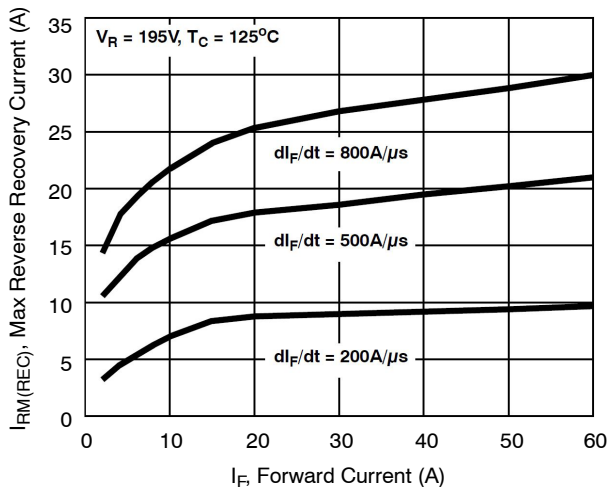


Figure 5. Maximum Reverse Recovery Current vs. Forward Current

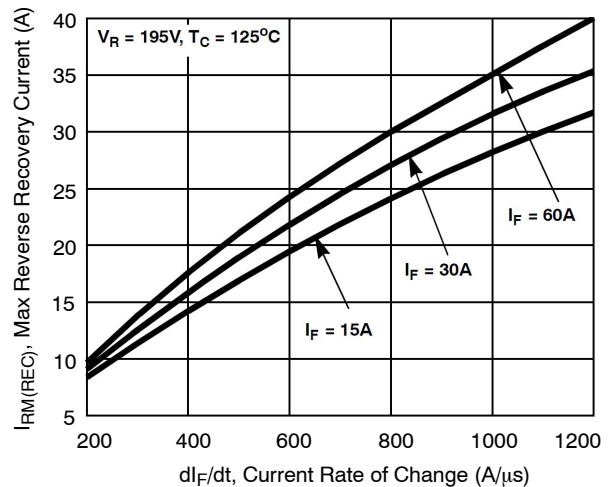
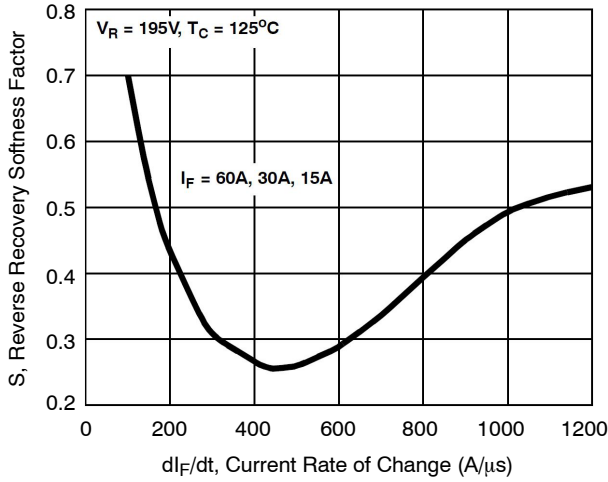


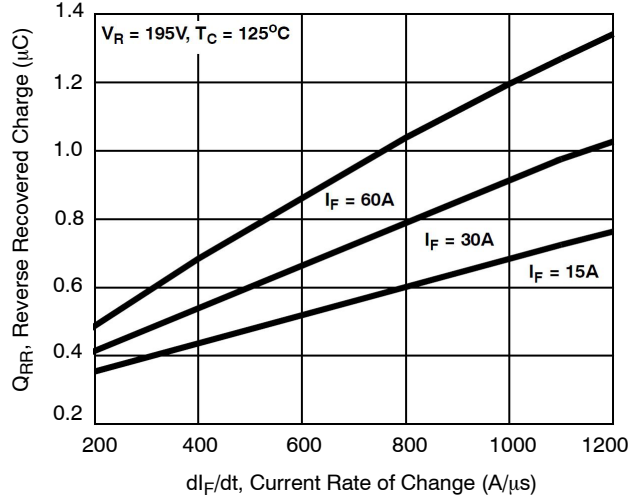
Figure 6. Maximum Reverse Recovery Current vs.  $di_F/dt$

# FFH30US30DN

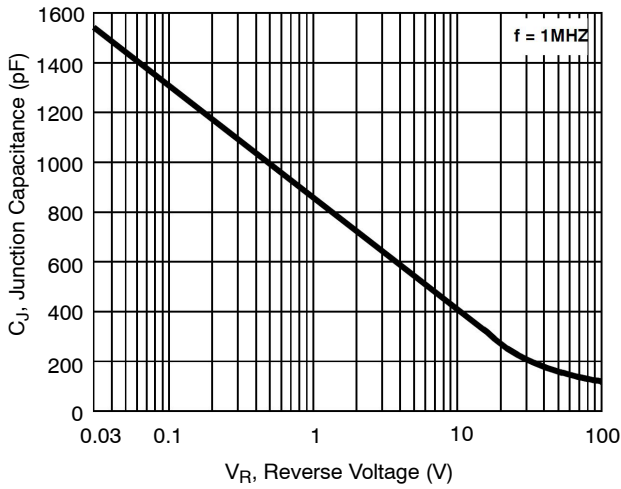
## TYPICAL PERFORMANCE CHARACTERISTICS (per leg) (continued)



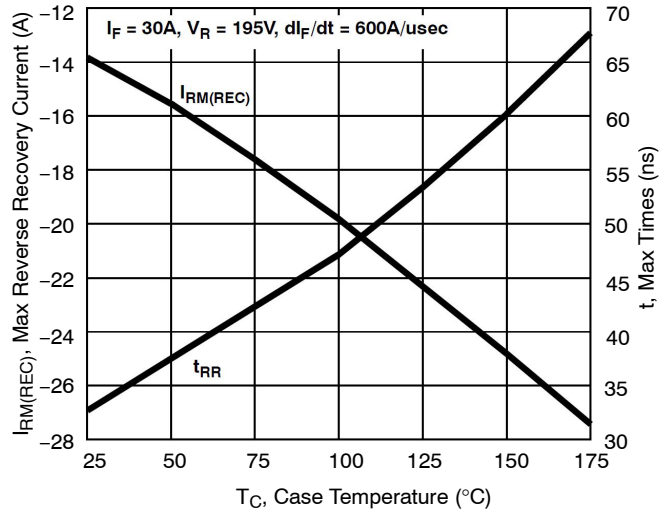
**Figure 7. Reverse Recovery Softness Factor vs.  $di_F/dt$**



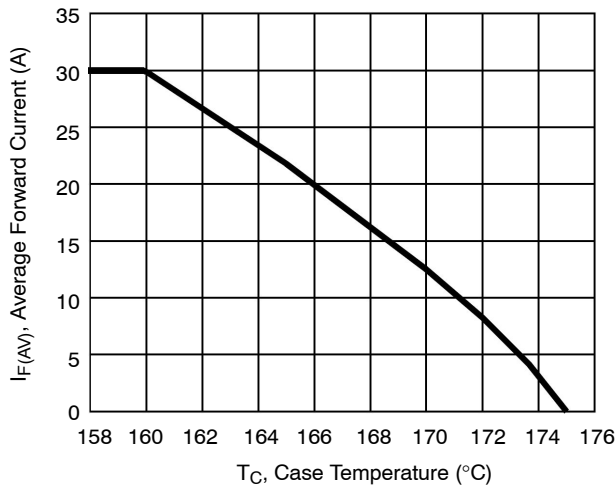
**Figure 8. Reverse Recovery Charge vs.  $di_F/dt$**



**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)

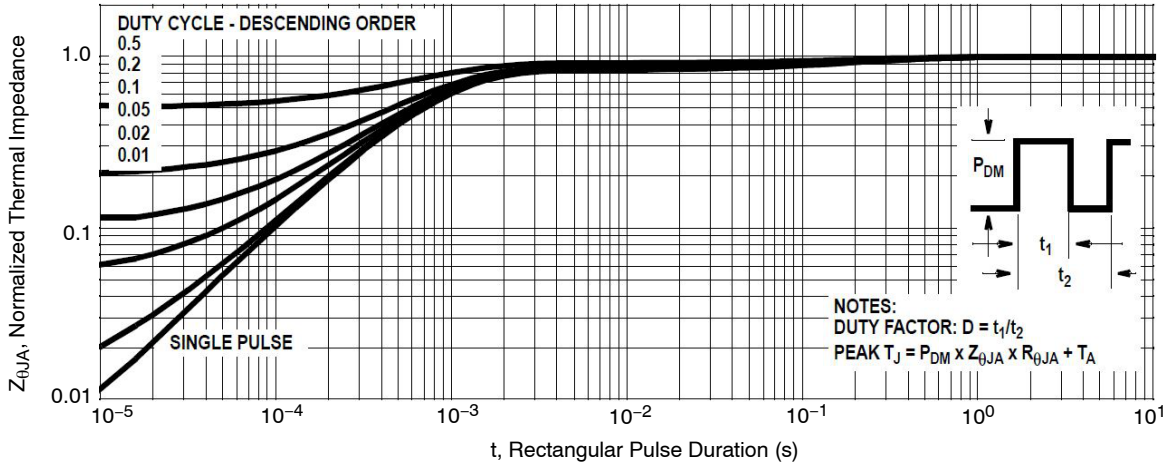


Figure 12. Normalized Maximum Transient Thermal Impedance

TEST CIRCUITS AND WAVEFORMS

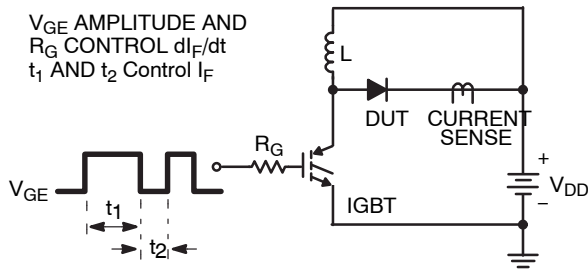


Figure 13.  $t_{rr}$  Test Circuit

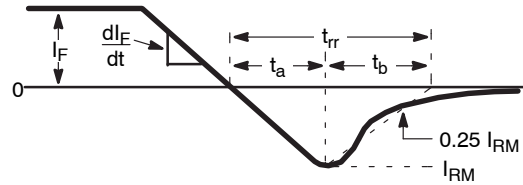


Figure 14.  $t_{rr}$  Waveforms and Definitions

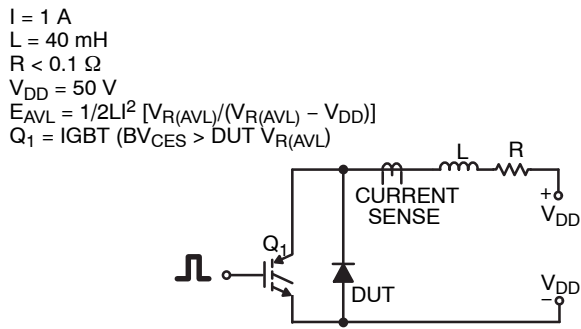


Figure 15. Avalanche Energy Test Circuit

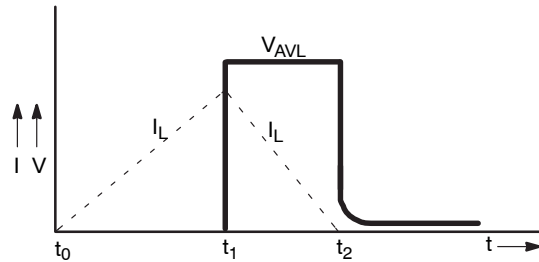
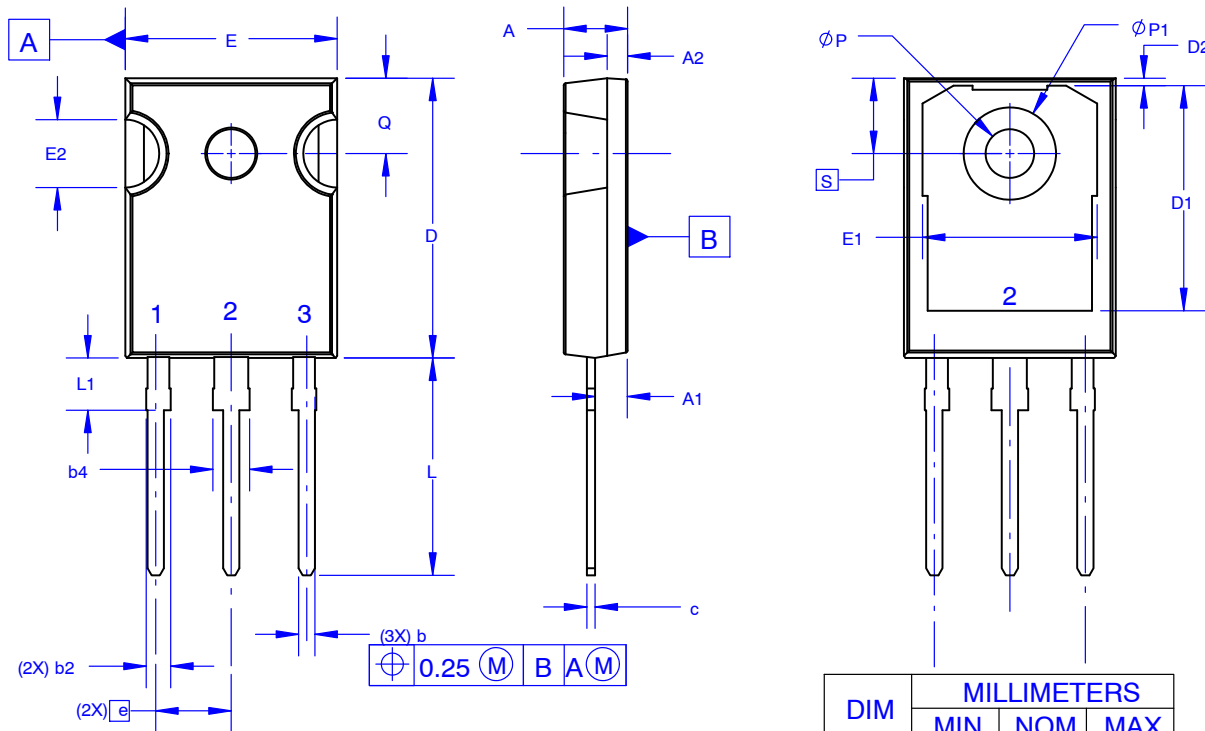


Figure 16. Avalanche Current and Voltage Waveforms

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

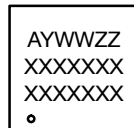
DATE 31 JAN 2019



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
∅P	3.51	3.58	3.65
∅P1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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