

## FFH30US30DN

### 30A, 300V Stealth™ Diode

#### General 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

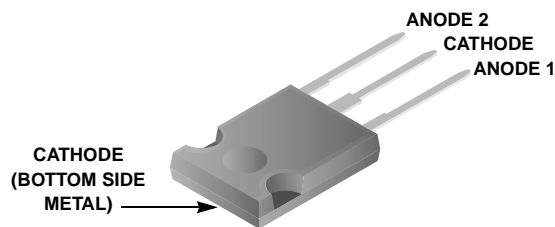
- Soft Recovery . . . . .  $t_b/t_a > 0.45$
- Fast Recovery . . . . .  $t_{rr} < 50ns$
- High Operating Temperature . . . . . 175°C
- Reverse Voltage . . . . . 300V
- Avalanche Energy Rating . . . . . .20mJ

#### Applications

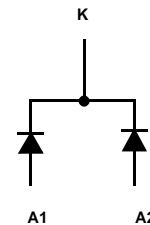
- Switch Mode Power Supplies
- Power Factor Correction
- Uninterruptable Power Supplies
- Motor Drives
- Welders

#### Package

JEDEC STYLE 3 LEAD TO-247



#### Symbol



#### Device Maximum Ratings (per leg) $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{RRM}$	Repetitive Peak Reverse Voltage	300	V
$V_{RWM}$	Working Peak Reverse Voltage	300	V
$V_R$	DC Blocking Voltage	300	V
$I_{F(AV)}$	Average Rectified Forward Current ( $T_C = 160^\circ\text{C}$ )	30	A
	Total Device Current (Both Legs)	60	A
$I_{FRM}$	Repetitive Peak Surge Current (20kHz Square Wave)	70	A
$I_{FSM}$	Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz)	325	A
$P_D$	Power Dissipation	230	W
$E_{AVL}$	Avalanche Energy (1A, 40mH)	20	mJ
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 175	°C
$T_L$ $T_{PKG}$	Maximum Temperature for Soldering		
	Leads at 0.063in (1.6mm) from Case for 10s Package Body for 10s, See Application Note AN-7528	300 260	°C °C

CAUTION: Stresses above those listed in "Device Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

## Package Marking and Ordering Information

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

## Electrical Characteristics (per leg) $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off State Characteristics

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

### On State Characteristics

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

### Dynamic Characteristics

$C_J$	Junction Capacitance	$V_R = 10\text{V}, I_F = 0\text{A}$	-	410	-	$\text{pF}$
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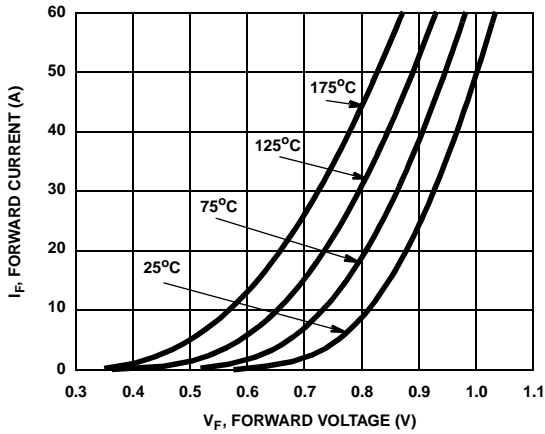
### Switching Characteristics

$t_{rr}$	Reverse Recovery Time	$I_F = 1\text{A}, di_F/dt = 100\text{A}/\mu\text{s}, V_R = 15\text{V}$	-	29	50	$\text{ns}$
			$I_F = 30\text{A}, di_F/dt = 100\text{A}/\mu\text{s}, V_R = 15\text{V}$	-	32	55
$t_{rr}$	Reverse Recovery Time	$I_F = 30\text{A}, di_F/dt = 200\text{A}/\mu\text{s}, V_R = 195\text{V}, T_C = 25^\circ\text{C}$	-	46	-	$\text{ns}$
$I_{RM(REC)}$	Maximum Reverse Recovery Current		-	5.3	-	A
$Q_{RR}$	Reverse Recovered Charge		-	140	-	$\text{nC}$
$t_{rr}$	Reverse Recovery Time		-	77	-	$\text{ns}$
S	Softness Factor ( $t_b/t_a$ )	$V_R = 195\text{V}, T_C = 125^\circ\text{C}$	-	0.45	-	-
$I_{RM(REC)}$	Maximum Reverse Recovery Current		-	9	-	A
$Q_{RR}$	Reverse Recovered Charge		-	400	-	$\text{nC}$
$t_{rr}$	Reverse Recovery Time		-	54	-	$\text{ns}$
S	Softness Factor ( $t_b/t_a$ )	$I_F = 30\text{A}, di_F/dt = 1000\text{A}/\mu\text{s}, V_R = 195\text{V}, T_C = 125^\circ\text{C}$	-	0.49	-	-
$I_{RM(REC)}$	Maximum Reverse Recovery Current		-	32	-	A
$Q_{RR}$	Reverse Recovered Charge		-	930	-	$\text{nC}$

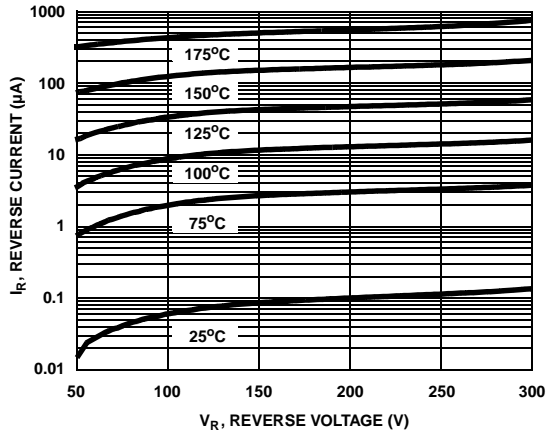
### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	TO-247	-	-	0.65	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	TO-247	-	-	30	$^\circ\text{C}/\text{W}$

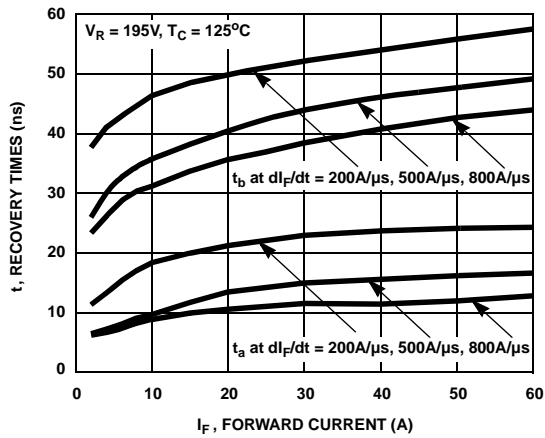
**Typical Performance Curves (per leg)**



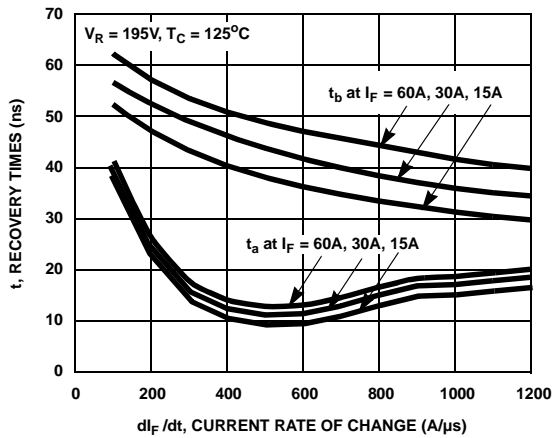
**Figure 1. Forward Current vs Forward Voltage**



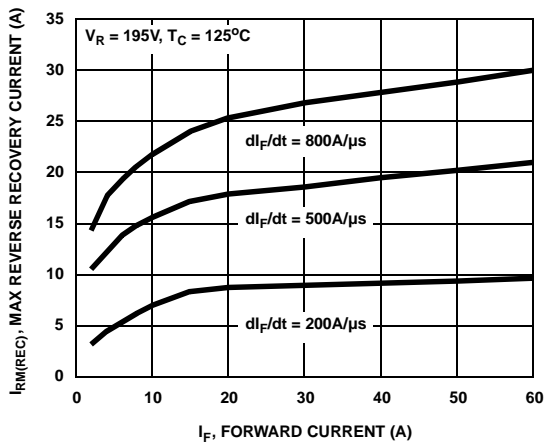
**Figure 2. Reverse Current vs Reverse Voltage**



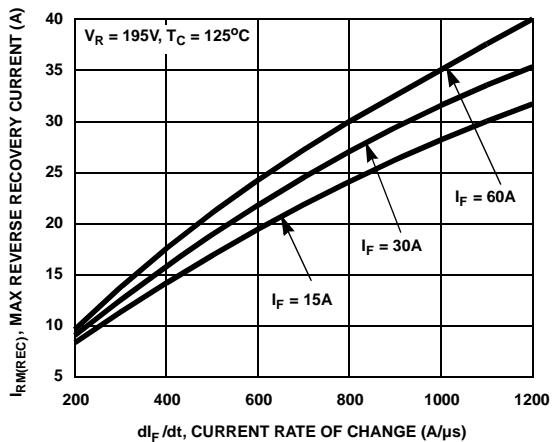
**Figure 3.  $t_a$  and  $t_b$  Curves vs Forward Current**



**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  $di_F/dt$**

Typical Performance Curves (per leg) (Continued)

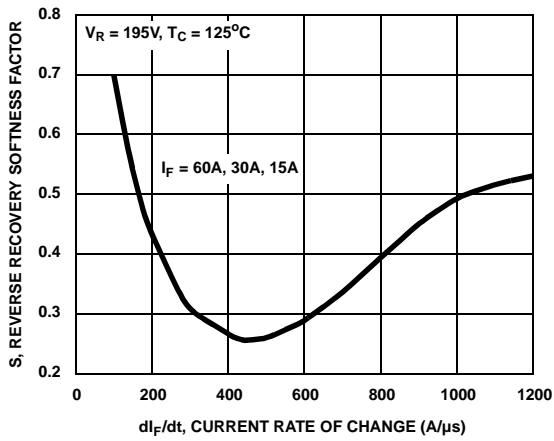


Figure 7. Reverse Recovery Softness Factor vs  $dI_F/dt$

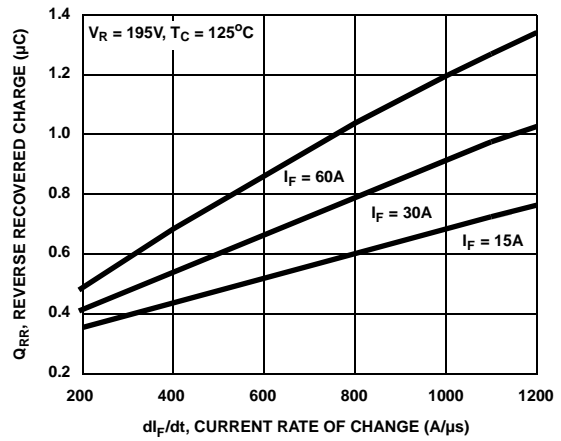


Figure 8. Reverse Recovery Charge vs  $dI_F/dt$

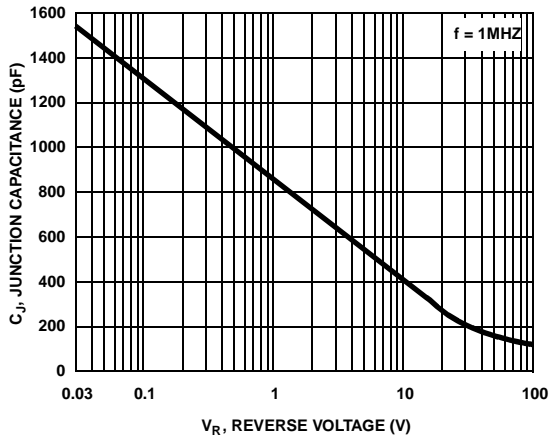


Figure 9. Junction Capacitance vs Reverse Voltage

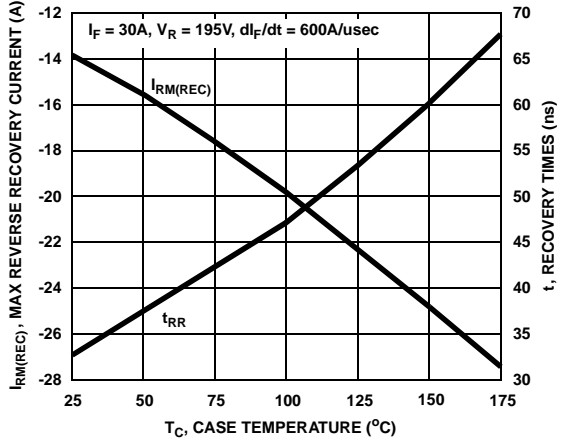


Figure 10. Maximum Reverse Recovery Current and  $t_{rr}$  vs Case Temperature

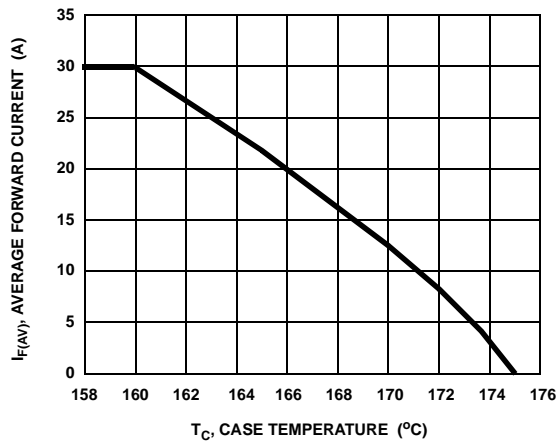


Figure 11. DC CURRENT DERATING CURVE

Typical Performance Curves (per leg) (Continued)

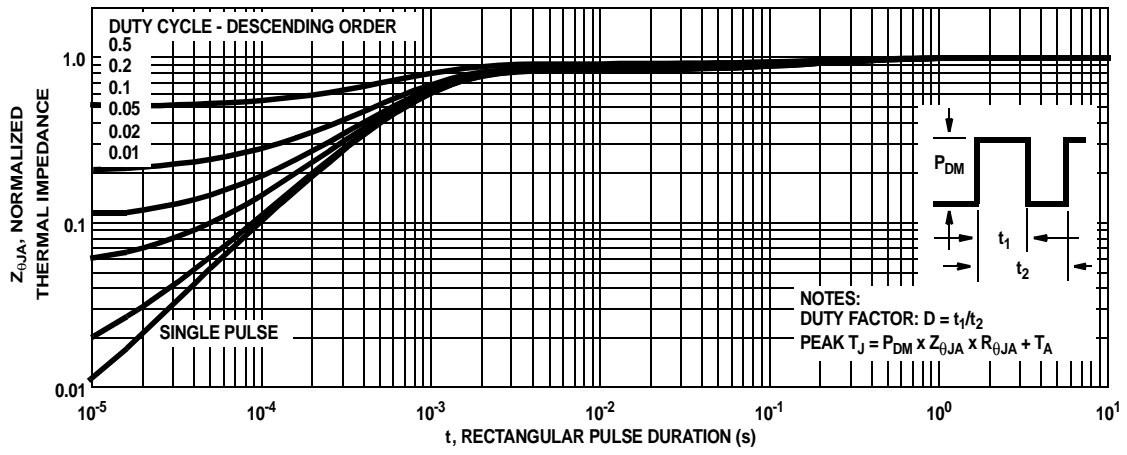


Figure 12. Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveforms

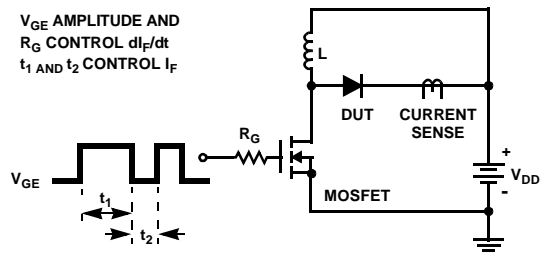


Figure 13.  $t_{tr}$  Test Circuit

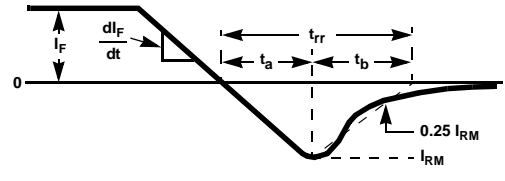
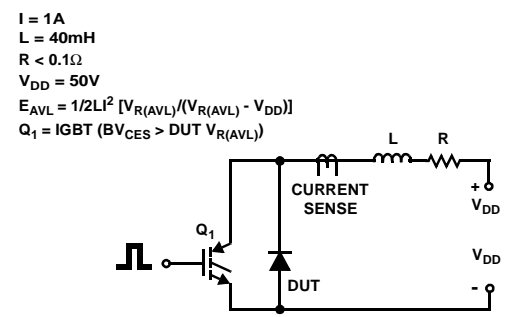


Figure 14.  $t_{tr}$  Waveforms and Definitions



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

Figure 15. Avalanche Energy Test Circuit

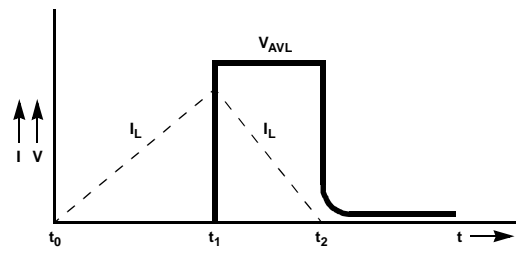


Figure 16. Avalanche Current and Voltage Waveforms

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