

MOSFET - Power, Single P-Channel, SO8-FL -30 V, 1.4 mΩ, -263 A



NTMFS002P03P8Z

Features

- Ultra Low $R_{DS(on)}$ to Improve System Efficiency
- Advanced Package Technology in 5x6mm for Space Saving and Excellent Thermal Conduction
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Power Load Switch
- Protection: Reverse Current, Over Voltage, and Reverse Negative Voltage
- Battery Management

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V _{DSS}	-30	V
Gate-to-Source Voltage		V _{GS}	±25	V
Continuous Drain Current R _{θJC} (Notes 1, 2)	Steady State	T _C = 25°C	I _D	A
		T _C = 85°C	-263	
	T _C = 25°C	P _D	-189	
Power Dissipation R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	I _D	A
		T _A = 85°C	-40.2	
	T _A = 25°C	P _D	-29	
Continuous Drain Current R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	I _D	A
		T _A = 85°C	-40.2	
		T _A = 25°C	P _D	
Pulsed Drain Current	T _A = 25°C, t _p = 10 µs	I _{DM}	-648	A
Single Pulse Drain-to-Source Avalanche Energy (I _L =65.16 A)		E _{AS}	212.3	mJ
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T _L	260		°C

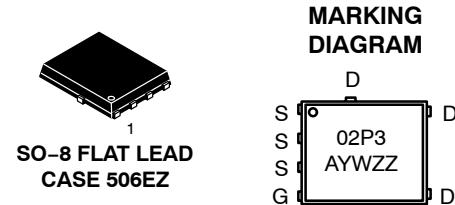
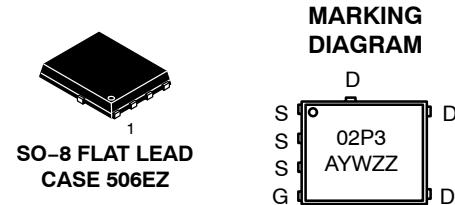
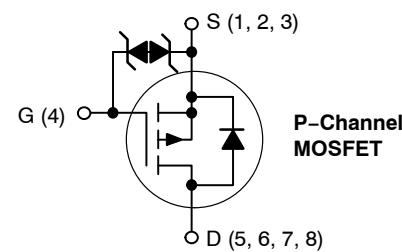
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Drain) (Note 2)	R _{θJC}	0.9	°C/W
Junction-to-Ambient – Steady State (Note 2)	R _{θJA}	38.3	°C/W

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 1 in², 2 oz. Cu pad. Assuming a 76 mm x 76 mm x 1.6 mm board.

V _{(BR)DSS}	R _{DS(on)}	I _D
-30 V	1.4 mΩ @ -10 V	-263 A
	2.3 mΩ @ -4.5 V	



A = Assembly Location
 Y = Year
 W = Work Week
 ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping [†]
NTMFS002P03P8ZT1G	SO8-FL (Pb-Free)	1500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

NTMFS002P03P8Z

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit		
OFF CHARACTERISTICS									
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}$, $I_D = -250 \mu\text{A}$		-30			V		
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}}/T_J$	$I_D = -250 \mu\text{A}$, ref to 25°C			-3.3		$\text{mV}/^\circ\text{C}$		
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{GS}} = 0 \text{ V}$, $V_{\text{DS}} = -24 \text{ V}$	$T_J = 25^\circ\text{C}$			-1.0	μA		
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}$, $V_{\text{GS}} = \pm 25 \text{ V}$				± 10	μA		
ON CHARACTERISTICS (Note 3)									
Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}$, $I_D = -250 \mu\text{A}$		-1.0		-3.0	V		
Threshold Temperature Coefficient	$V_{\text{GS}(\text{TH})}/T_J$	$I_D = -250 \mu\text{A}$, ref to 25°C			5.7		$\text{mV}/^\circ\text{C}$		
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -10 \text{ V}$, $I_D = -23 \text{ A}$			0.9	1.4	$\text{m}\Omega$		
		$V_{\text{GS}} = -4.5 \text{ V}$, $I_D = -20 \text{ A}$			1.5	2.3			
Foward Transconductance	g_{FS}	$V_{\text{DS}} = -5 \text{ V}$, $I_D = -20 \text{ A}$			129		S		
CHARGES AND CAPACITANCES									
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$, $V_{\text{DS}} = -15 \text{ V}$			14950		pF		
Output Capacitance	C_{oss}				5280				
Reverse Transfer Capacitance	C_{rss}				4870				
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = -4.5 \text{ V}$, $V_{\text{DS}} = -15 \text{ V}$, $I_D = -23 \text{ A}$			217		nC		
Threshold Gate Charge	$Q_{\text{G}(\text{TH})}$				13				
Gate-to-Source Charge	Q_{GS}				35				
Gate-to-Drain Charge	Q_{GD}				145				
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = -10 \text{ V}$, $V_{\text{DS}} = -15 \text{ V}$, $I_D = -23 \text{ A}$			365				
SWITCHING CHARACTERISTICS, $V_{\text{GS}} = 4.5 \text{ V}$ (Note 3)									
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}} = -4.5 \text{ V}$, $V_{\text{DS}} = -15 \text{ V}$, $I_D = -23 \text{ A}$, $R_G = 6 \Omega$			68		ns		
Rise Time	t_r				375				
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$				160				
Fall Time	t_f				317				
SWITCHING CHARACTERISTICS, $V_{\text{GS}} = 10 \text{ V}$ (Note 3)									
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}} = -10 \text{ V}$, $V_{\text{DS}} = -15 \text{ V}$, $I_D = -23 \text{ A}$, $R_G = 6 \Omega$			27		ns		
Rise Time	t_r				78				
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$				280				
Fall Time	t_f				295				
DRAIN-SOURCE DIODE CHARACTERISTICS									
Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}$, $I_s = -23 \text{ A}$	$T_J = 25^\circ\text{C}$		-0.65	-1.3	V		
			$T_J = 125^\circ\text{C}$		-0.48				
Reverse Recovery Time	t_{RR}	$V_{\text{GS}} = 0 \text{ V}$, $dl_s/dt = 100 \text{ A}/\mu\text{s}$, $I_s = -23 \text{ A}$			82		ns		
Charge Time	t_a				47				
Discharge Time	t_b				36				
Reverse Recovery Charge	Q_{RR}				180				
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.									
3. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.									

TYPICAL CHARACTERISTICS

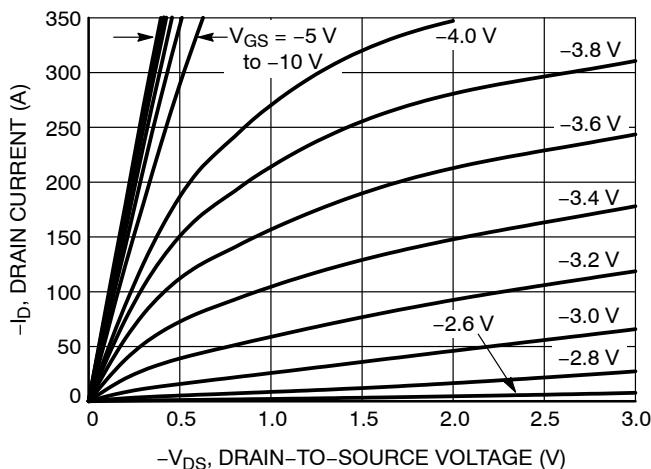


Figure 1. On-Region Characteristics

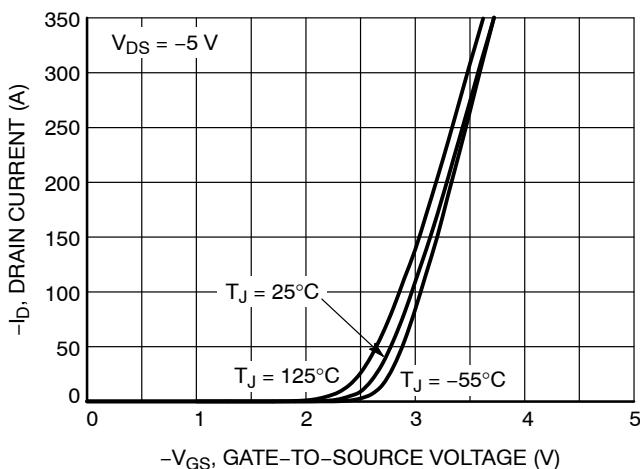


Figure 2. Transfer Characteristics

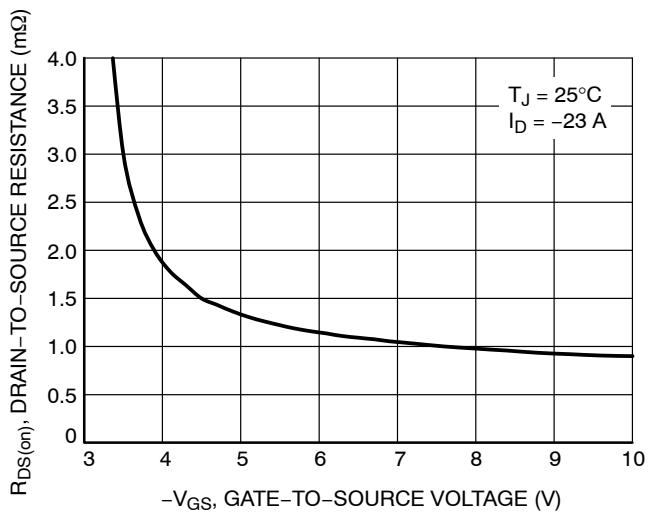


Figure 3. On-Resistance vs. Gate-to-Source Voltage

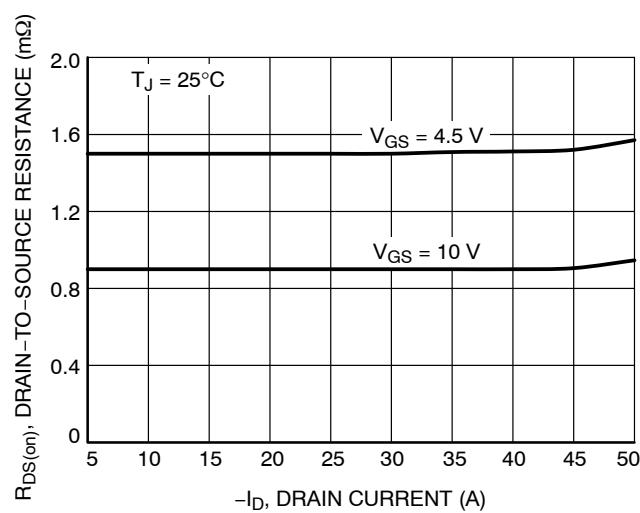


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

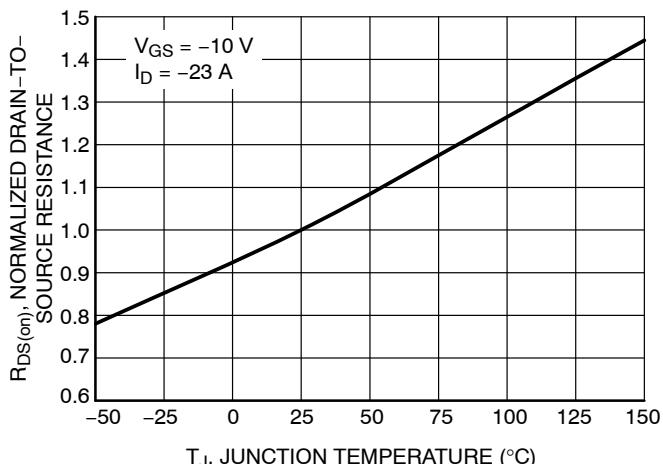


Figure 5. On-Resistance Variation with Temperature

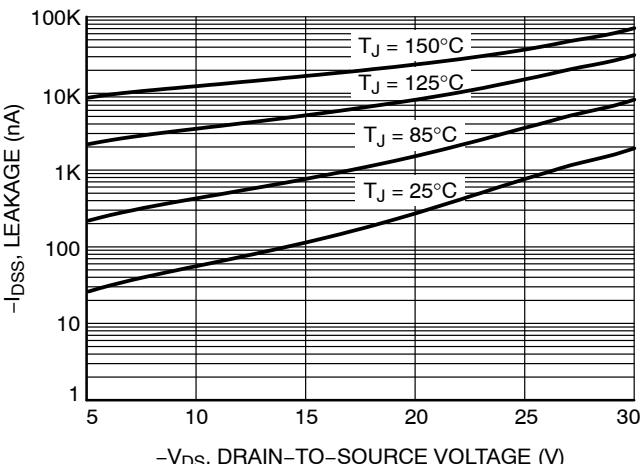


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

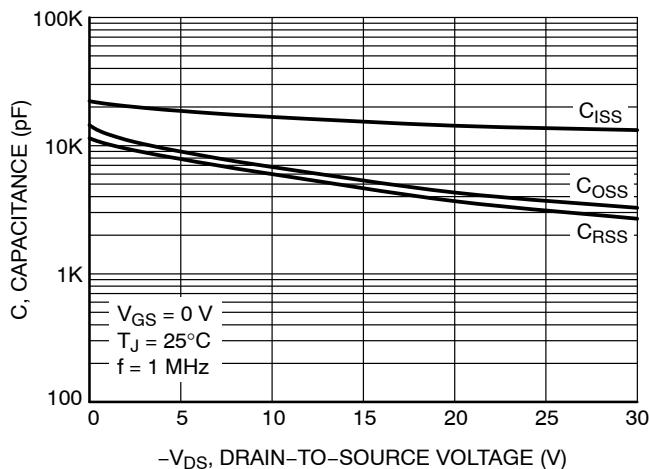


Figure 7. Capacitance Variation

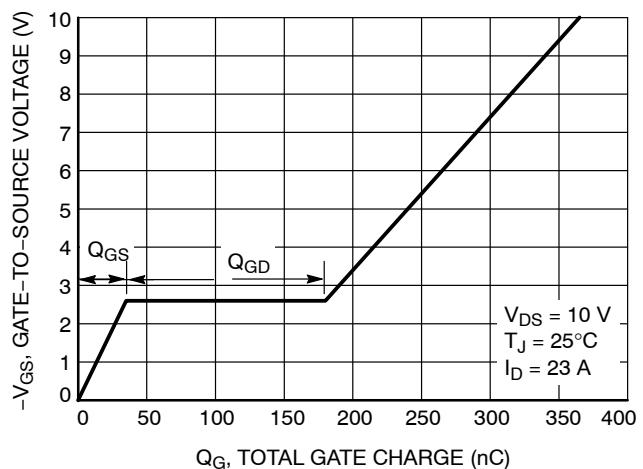


Figure 8. Gate-to-Source Voltage vs. Total Charge

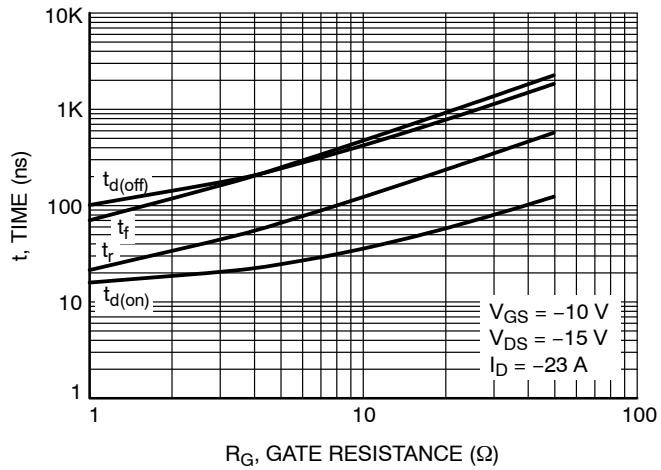


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

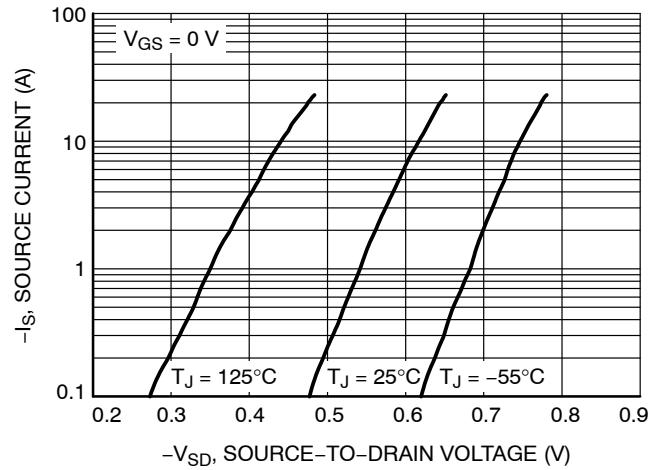


Figure 10. Diode Forward Voltage vs. Current

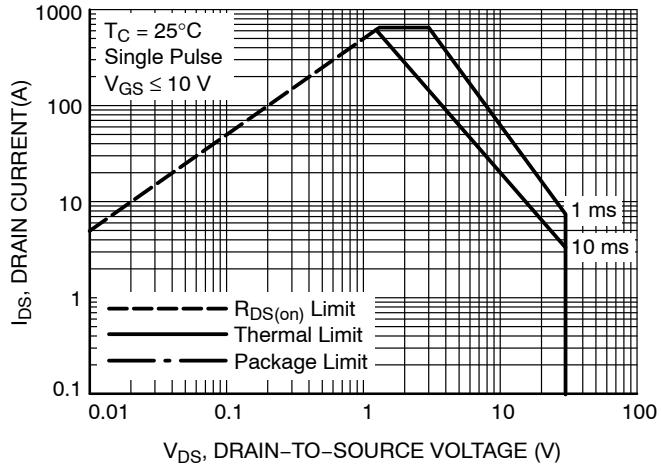


Figure 11. Maximum Rated Forward Biased Safe Operating Area

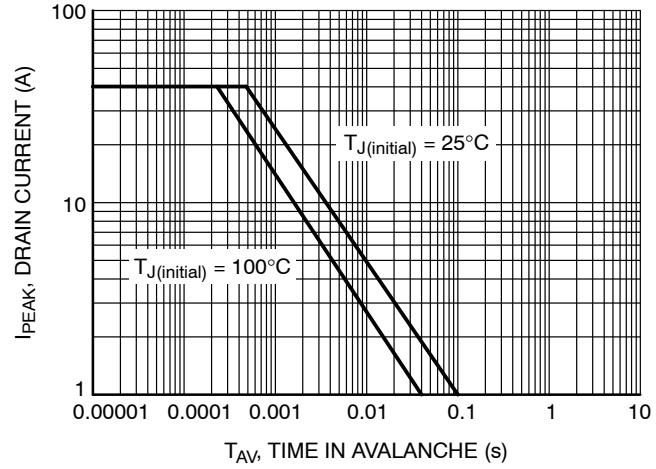
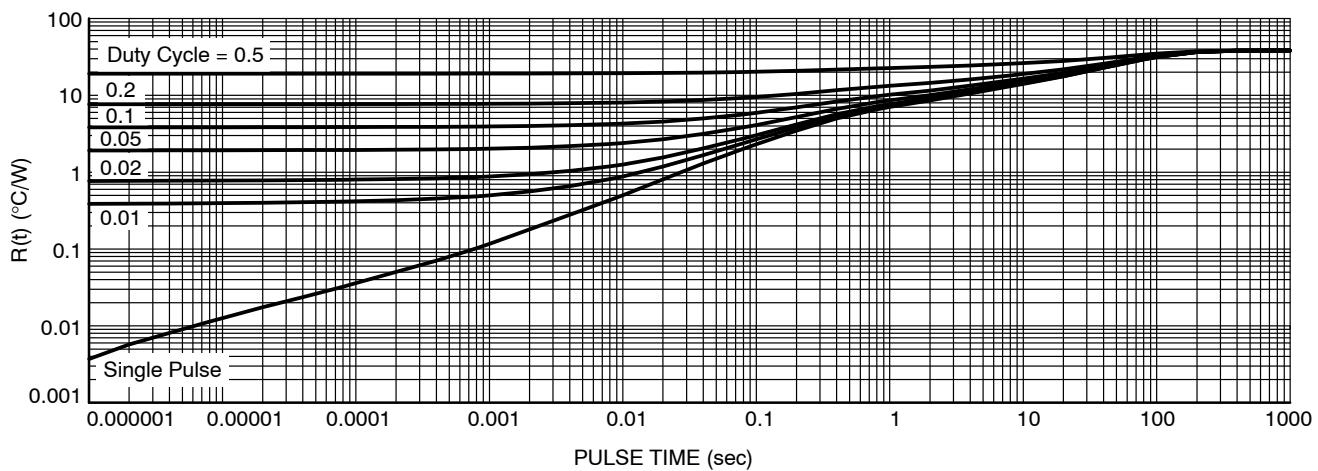
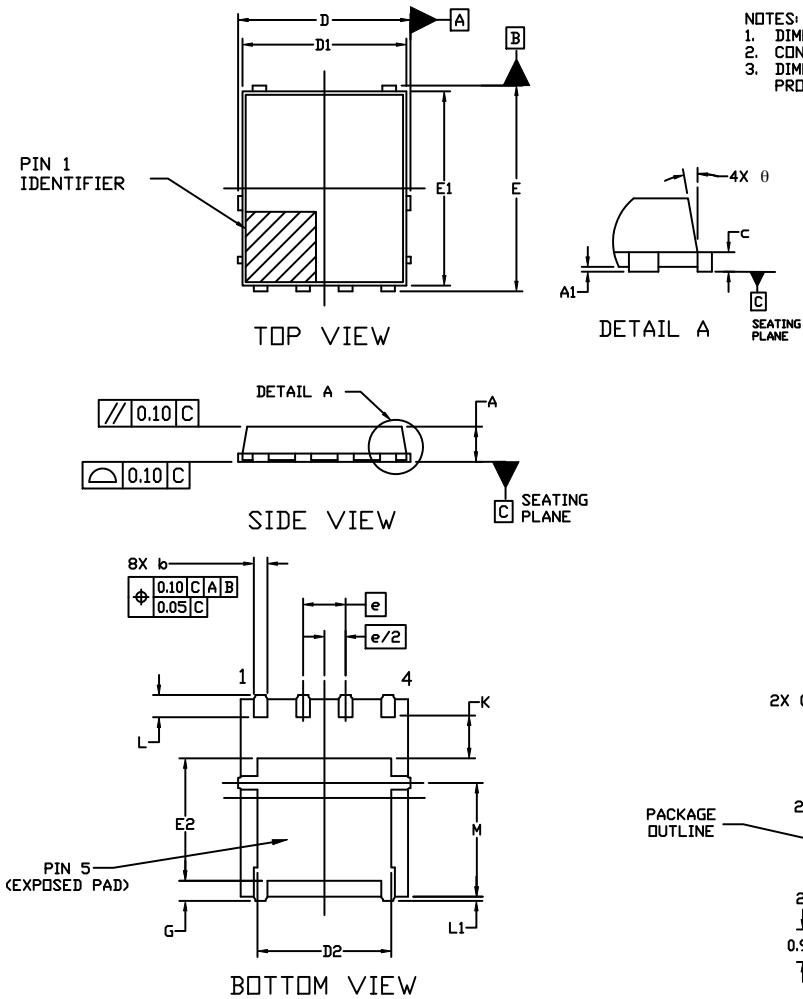


Figure 12. IpEAK vs. Time in Avalanche

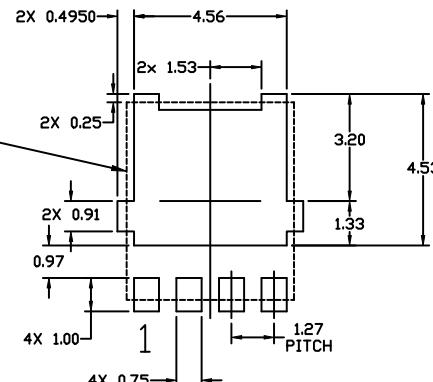
TYPICAL CHARACTERISTICS**Figure 13. Thermal Characteristics**

PACKAGE DIMENSIONS

DFN5 5x6, 1.27P (SO-8FL)
CASE 506EZ
ISSUE O

NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
 2. CONTROLLING DIMENSION: MILLIMETERS
 3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

MILLIMETERS		
DIM	MIN.	NOM.
		MAX.
A	0.90	1.00
A1	0.00	---
b	0.33	0.41
c	0.23	0.28
D	5.00	5.15
D1	4.70	4.90
D2	3.80	4.00
E	6.00	6.15
E1	5.70	5.90
E2	3.45	3.65
e	1.27	BSC
G	0.51	0.575
K	1.10	1.20
L	0.51	0.575
L1	1.25	REF
M	3.00	3.40
θ	0°	---
		12°



RECOMMENDED MOUNTING FOOTPRINT

* For additional information on our Pb-Free strategy and soldering details, please download the [ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/1](#).

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