

NTMFS4837N

Power MOSFET

30 V, 74 A, Single N-Channel, SO-8 FL

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- These are Pb-Free Devices

Applications

- CPU Power Delivery
- DC-DC Converters
- Low Side Switching

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MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V _{DSS}	30	V
Gate-to-Source Voltage			V _{GS}	20	V
Continuous Drain Current R _{θJA} (Note 1)	Steady State	T _A = 25°C	I _D	16	A
		T _A = 85°C		11.5	
Power Dissipation R _{θJA} (Note 1)		T _A = 25°C	P _D	2.2	W
Continuous Drain Current R _{θJA} (Note 2)		T _A = 25°C	I _D	10	A
		T _A = 85°C		7	
Power Dissipation R _{θJA} (Note 2)		T _A = 25°C	P _D	0.88	W
Continuous Drain Current R _{θJC} (Note 1)		T _C = 25°C	I _D	74	A
		T _C = 85°C		53	
Power Dissipation R _{θJC} (Note 1)		T _C = 25°C	P _D	47.2	W
Pulsed Drain Current	t _p =10μs	T _A = 25°C	I _{DM}	148	A
Operating Junction and Storage Temperature			T _J , T _{STG}	-55 to +150	°C
Source Current (Body Diode)			I _S	39	A
Drain to Source dV/dt			dV/dt	6	V/ns
Single Pulse Drain-to-Source Avalanche Energy (V _{DD} = 30 V, V _{GS} = 10 V, I _L = 22 A _{pk} , L = 1.0 mH, R _G = 25 Ω)			EAS	242	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T _L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

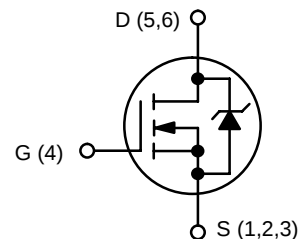
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



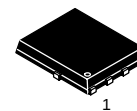
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$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
30 V	5.0 m Ω @ 10 V	74 A
	7.5 m Ω @ 4.5 V	

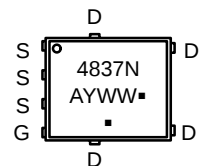


N-CHANNEL MOSFET



SO-8 FLAT LEAD
CASE 488AA
STYLE 1

MARKING DIAGRAM



A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping [†]
NTMFS4837NT1G	SO-8 FL (Pb-Free)	1500 / Tape & Reel
NTMFS4837NT3G	SO-8 FL (Pb-Free)	5000 / Tape & Reel

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

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	2.65	°C/W
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	56.75	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	142.2	

1. Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.
2. Surface-mounted on FR4 board using the minimum recommended pad size.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			25		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}$	$T_J = 25^\circ\text{C}$		1	μA
			$T_J = 125^\circ\text{C}$		10	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	1.5		2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			5.7		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V to } 11.5\text{ V}$	$I_D = 30\text{ A}$		3.5	m Ω
			$I_D = 15\text{ A}$		3.5	
		$V_{GS} = 4.5\text{ V}$	$I_D = 30\text{ A}$		5.9	
			$I_D = 15\text{ A}$		5.9	
Forward Transconductance	g_{FS}	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		15		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 12\text{ V}$		2048		pF
Output Capacitance	C_{OSS}			444		
Reverse Transfer Capacitance	C_{RSS}			239		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}; I_D = 30\text{ A}$		14.2	22	nC
Threshold Gate Charge	$Q_{G(TH)}$			2.98		
Gate-to-Source Charge	Q_{GS}			5.7		
Gate-to-Drain Charge	Q_{GD}			6.7		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 11.5\text{ V}, V_{DS} = 15\text{ V}; I_D = 15\text{ A}$		34.2		nC

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 15\text{ A}, R_G = 3.0\text{ }\Omega$		14.2		ns
Rise Time	t_r			55		
Turn-Off Delay Time	$t_{d(OFF)}$			19		
Fall Time	t_f			10		
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 11.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 15\text{ A}, R_G = 3.0\text{ }\Omega$		8.5		ns
Rise Time	t_r			25.6		
Turn-Off Delay Time	$t_{d(OFF)}$			25.2		
Fall Time	t_f			9.2		

3. Pulse Test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
4. Switching characteristics are independent of operating junction temperatures.

NTMFS4837N

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}$, $I_S = 30\text{ A}$	$T_J = 25^\circ\text{C}$		0.85	1.2	V
			$T_J = 125^\circ\text{C}$		0.72		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}$, $dI_S/dt = 100\text{ A}/\mu\text{s}$, $I_S = 30\text{ A}$			24		ns
Charge Time	t_a				13		
Discharge Time	t_b				11		
Reverse Recovery Charge	Q_{RR}				14		nC

PACKAGE PARASITIC VALUES

Source Inductance	L_S	$T_A = 25^\circ\text{C}$		0.93		nH
Drain Inductance	L_D			0.005		
Gate Inductance	L_G			1.84		
Gate Resistance	R_G			2.8		Ω

- Pulse Test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Switching characteristics are independent of operating junction temperatures.

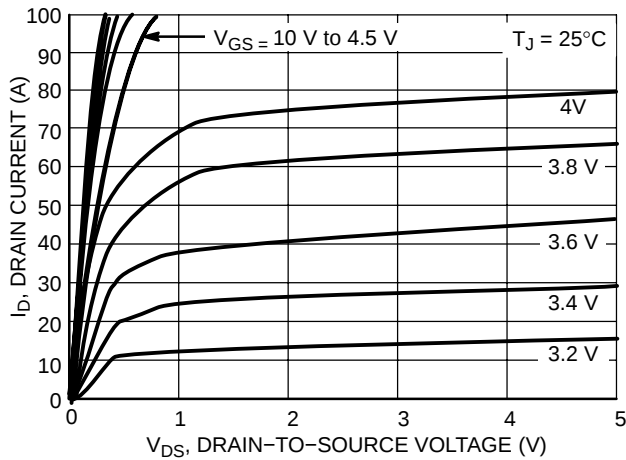


Figure 1. On-Region Characteristics

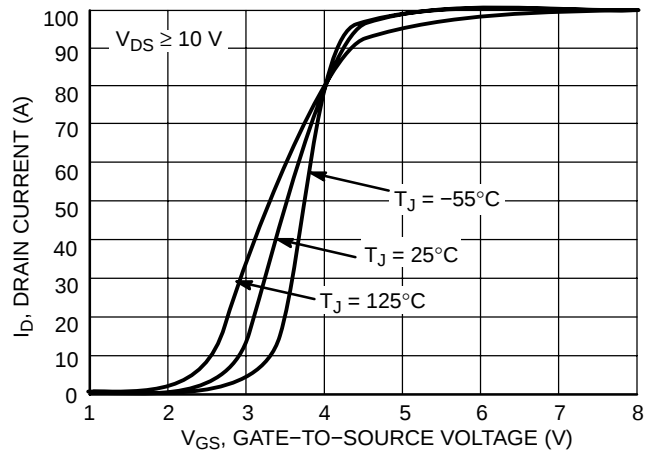


Figure 2. Transfer Characteristics

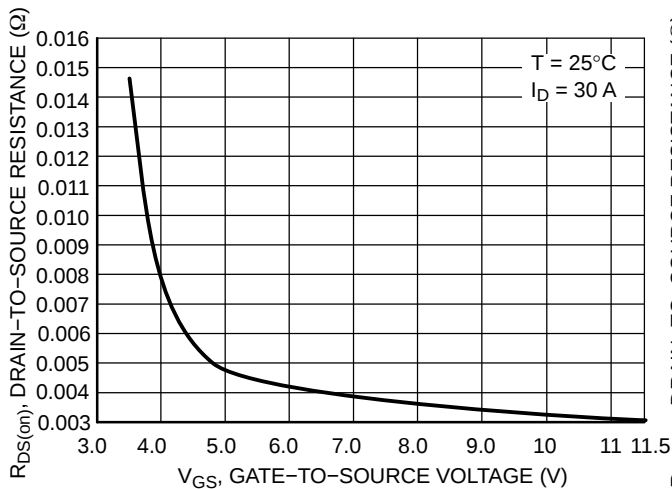


Figure 3. On-Resistance vs. V_{GS}

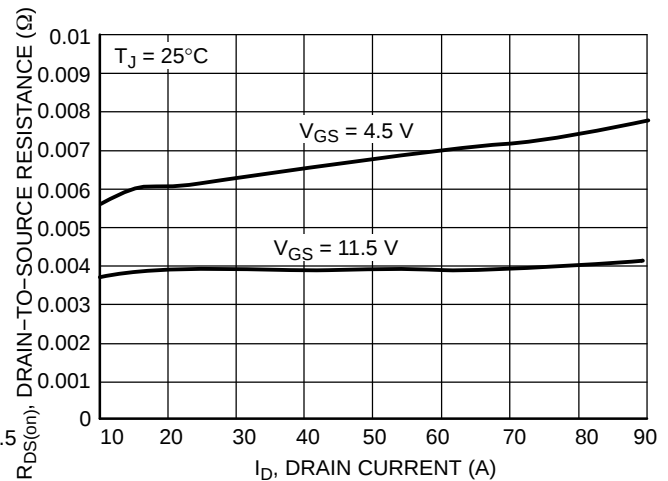


Figure 4. On-Resistance vs. Drain Current & Gate Voltage

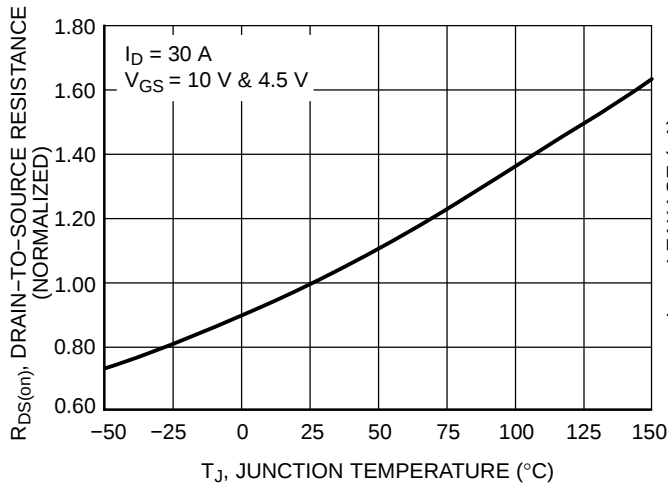


Figure 5. On-Resistance Variation with Temperature

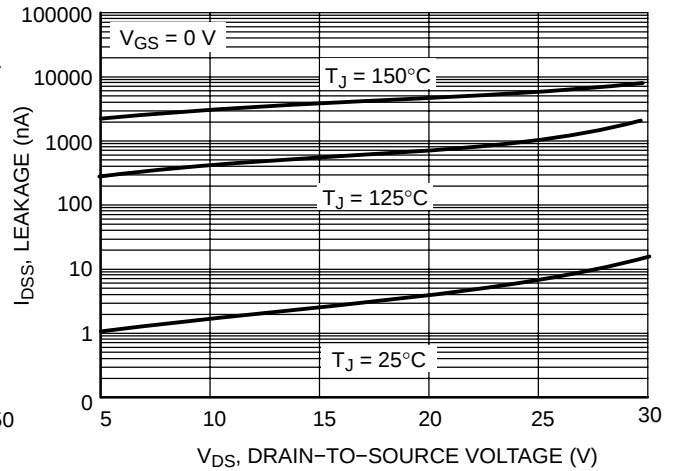


Figure 6. Drain-to-Source Leakage Current vs. Voltage

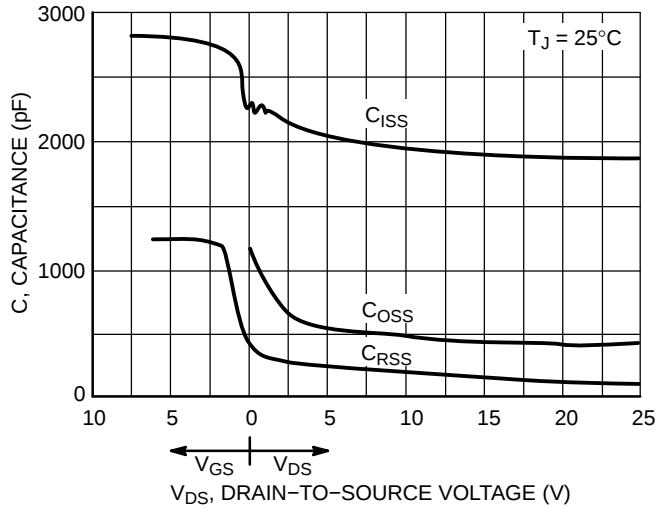


Figure 7. Capacitance Variation

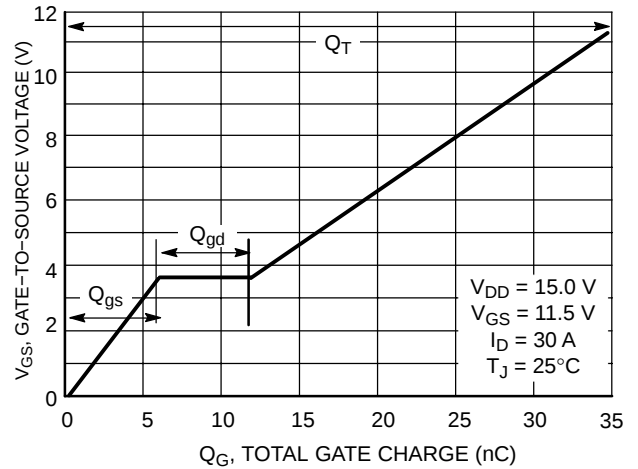


Figure 8. Gate-to-Source & Drain-to-Source Voltage vs. Total Charge

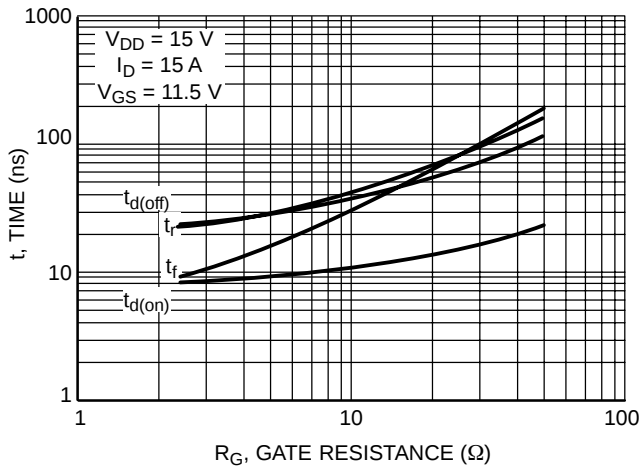


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

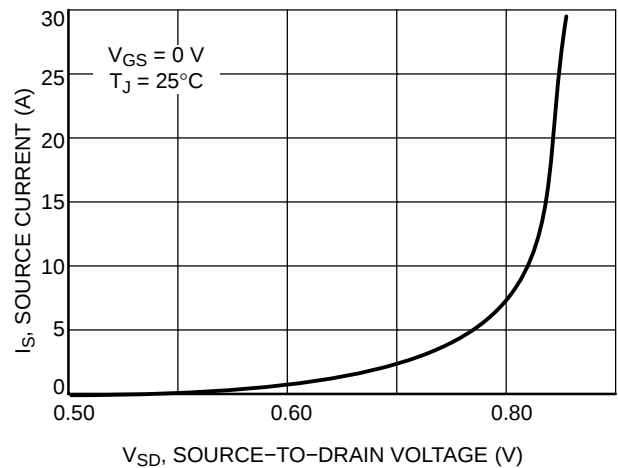


Figure 10. Diode Forward Voltage vs. Current

NTMFS4837N

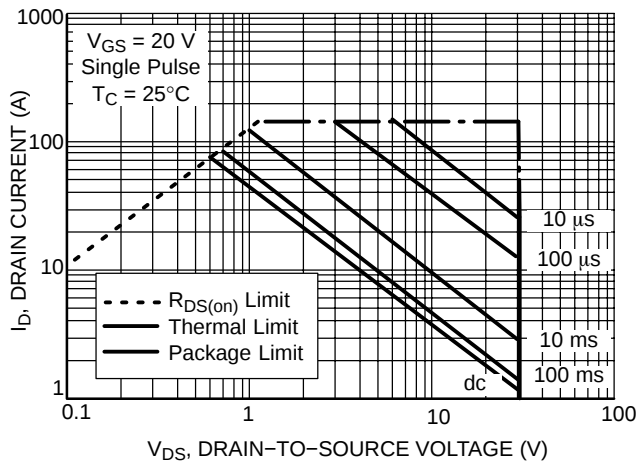


Figure 11. Maximum Rated Forward-Biased Safe Operating Range

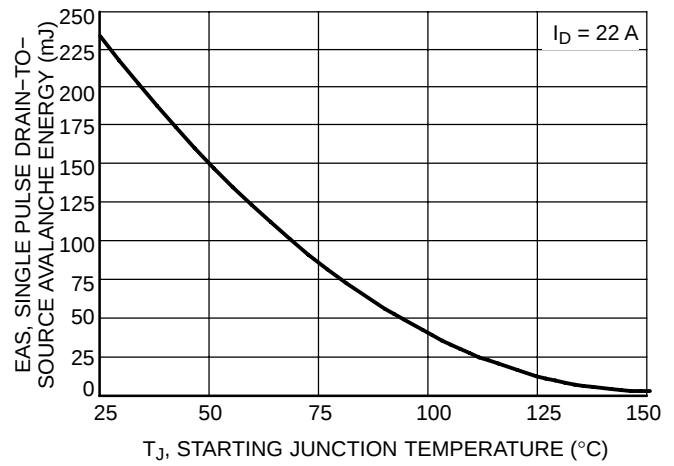


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

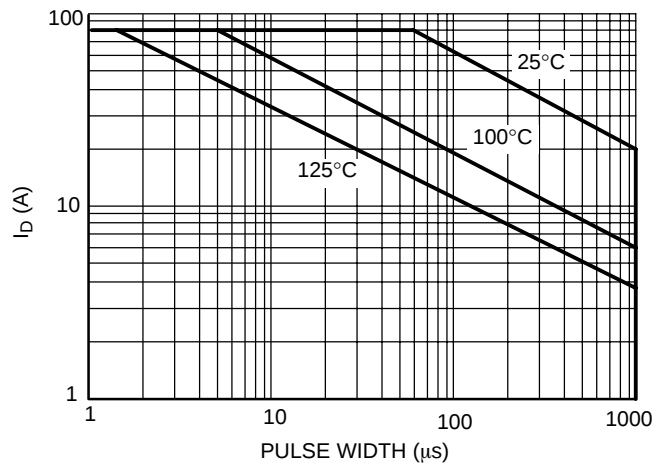
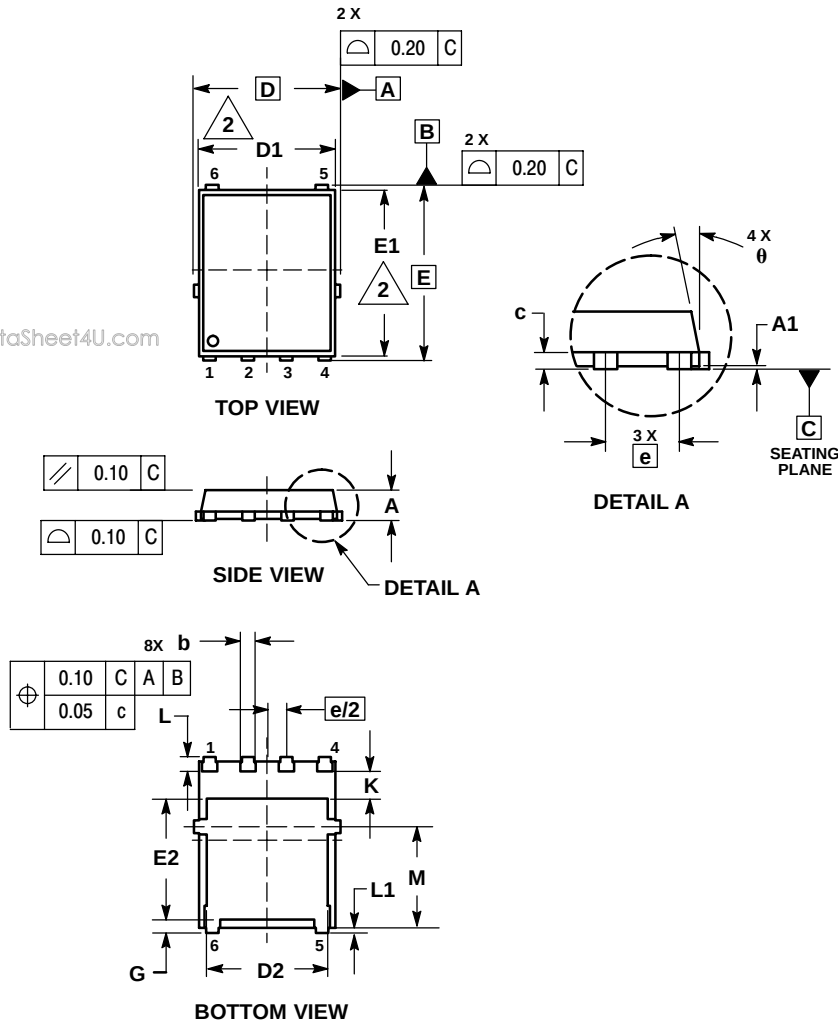


Figure 13. EAS vs. Pulse Width

NTMFS4837N

PACKAGE DIMENSIONS

SO-8 FLAT LEAD (DFN6) CASE 488AA-01 ISSUE B



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.90	0.99	1.20
A1	0.00	---	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.15 BSC		
D1	4.50	4.90	5.10
D2	3.50	---	4.22
E	6.15 BSC		
E1	5.50	5.80	6.10
E2	3.45	---	4.30
e	1.27 BSC		
G	0.51	0.61	0.71
K	0.51	---	---
L	0.51	0.61	0.71
L1	0.05	0.17	0.20
M	3.00	3.40	3.80
θ	0 °	---	12 °

STYLE 1:

1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN

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