

# NTMFSS1D1N06CL

## Product Preview

### Power MOSFET

60 V, 1.2 mΩ, 287 A, Single N-Channel, Source-Down SO8-FL

#### Features

- Small Footprint (5x6 mm) for Compact Design
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen-Free / BFR Free and are RoHS Compliant

#### Typical Applications

- DC-DC Converters
- Power Load Switch
- Notebook Battery Management
- Synchronous Rectifier

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	60	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	$T_C = 25^\circ\text{C}$	$I_D$ 287 A
		$T_C = 25^\circ\text{C}$	$P_D$ 200 W
Power Dissipation $R_{\theta JC}$ (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$ 40 A
		$T_A = 25^\circ\text{C}$	$P_D$ 3.9 W
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$ 900	A
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = \text{TBD A}, L = \text{TBD mH}$ )	$E_{AS}$	776	mJ
Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)	$T_L$	260	$^\circ\text{C}$

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 RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Note 2)	$R_{\theta JC}$	0.75	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	39	

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 in<sup>2</sup> pad size, 2 oz. Cu pad.

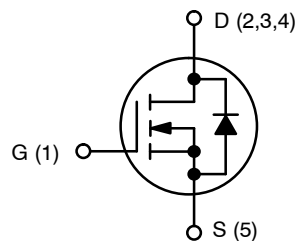
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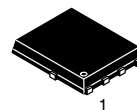
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$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
60 V	1.2 mΩ @ 10 V	287 A
	1.7 mΩ @ 4.5 V	



N-CHANNEL MOSFET



DFN8 5x6  
CASE 506EB

#### MARKING DIAGRAM



XXXXXX = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 W = Work Week  
 ZZ = Lot Traceability

#### ORDERING INFORMATION

Device	Package	Shipping†
NTMFSS1D1N06CLT1G	SO-8FL (Pb-Free)	1500 / Tape & Reel
NTMFSS1D1N06CLT3G	SO-8FL (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 Specification Brochure, BRD8011/D.

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## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA, ref to 25°C		22.9		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 60 V, T <sub>J</sub> = 25°C			10	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V			100	nA

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA	1.2		2.0	V
Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA, ref to 25°C		-5.9		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A		0.93	1.2	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 50 A		1.25	1.7	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 50 A		180		S
Gate Resistance	R <sub>G</sub>	T <sub>A</sub> = 25°C		TBD		Ω

### CHARGES & CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 25 V		8900		pF	
Output Capacitance	C <sub>OSS</sub>			3750			
Reverse Capacitance	C <sub>RSS</sub>			40			
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 30 V, I <sub>D</sub> = 50 A		52		nC	
Total Gate Charge	Q <sub>G(TOT)</sub>		V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 30 V, I <sub>D</sub> = 50 A		120		
Gate-to-Drain Charge	Q <sub>GD</sub>				12.7		
Gate-to-Source Charge	Q <sub>GS</sub>				21.4		
Plateau Voltage	V <sub>GP</sub>				2.8		

### SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DD</sub> = 30 V, I <sub>D</sub> = 50 A, R <sub>G</sub> = 2.5 Ω		21.8		ns
Rise Time	t <sub>r</sub>			79.1		
Turn-Off Delay Time	t <sub>d(OFF)</sub>			57.8		
Fall Time	t <sub>f</sub>			81.3		

### SOURCE-TO-DRAIN DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 50 A	T <sub>J</sub> = 25°C		0.78	1.2	V
			T <sub>J</sub> = 125°C		0.64		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, di/dt = 100 A/μs, I <sub>S</sub> = 50 A		98		ns	
Charge Time	t <sub>a</sub>			45			
Discharge Time	t <sub>b</sub>			53			
Reverse Recovery Charge	Q <sub>RR</sub>			190			nC

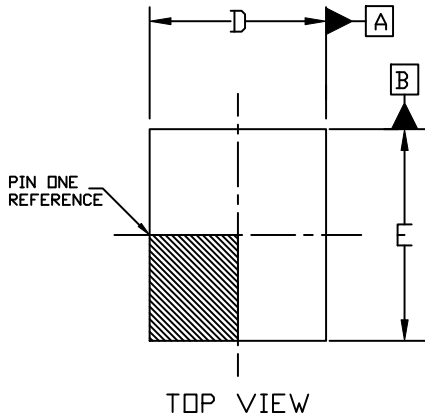
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Switching characteristics are independent of operating junction temperatures.

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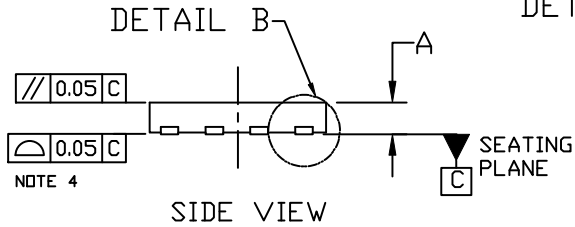
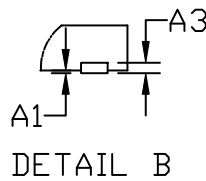
## PACKAGE DIMENSIONS

DFN8 5x6, 1.27P  
CASE 506EB  
ISSUE 0

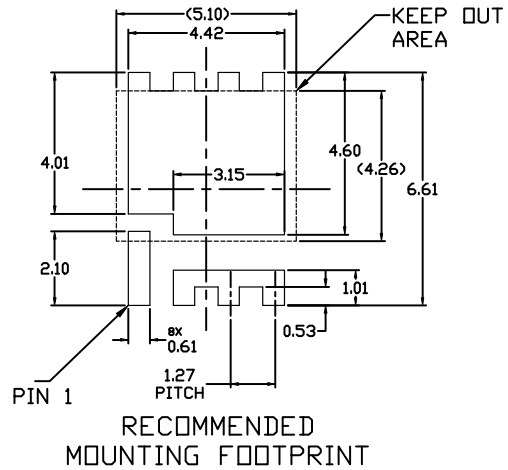
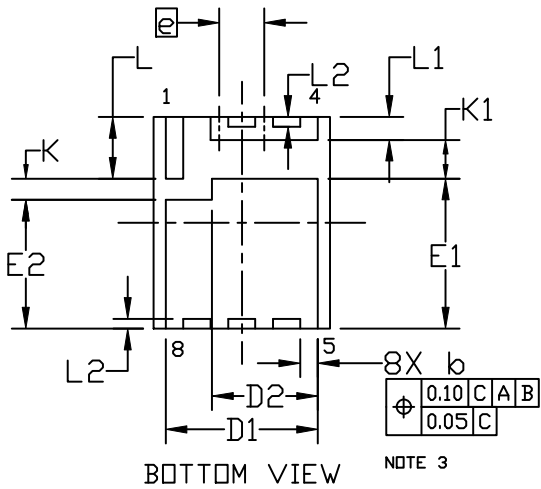


NOTES:


1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION *b* APPLIES TO PLATED TERMINALS AND IS MEASURED BETWEEN 0.15 AND 0.30MM FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. NO TRACES OR VIAS ALLOWED WITHIN THE KEEP OUT AREA OF THE FOOTPRINT AREA.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.70	0.80	0.90
A1	0.00	0.02	0.05
A3	0.20 REF		
<i>b</i>	0.45	0.50	0.55
D	4.90	5.00	5.10
D1	4.10	4.30	4.50
D2	2.90	3.00	3.10
E	5.90	6.00	6.10
E1	4.15	4.25	4.35
E2	3.55	3.65	3.75
<i>e</i>	1.27 BSC		
K	0.50	0.60	0.70
K1	1.00	1.10	1.20
L	1.65	1.75	1.85
L1	0.55	0.65	0.75
L2	0.18	0.28	0.38



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