

NTHS5441

Power MOSFET P-Channel ChipFET™

–3.9 Amps, –20 Volts

Features

- Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Logic Level Gate Drive
- Miniature ChipFET Surface Mount Package

Applications

- Power Management in Portable and Battery-Powered Products; i.e., Cellular and Cordless Telephones and PCMCIA Cards

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

Rating	Symbol	5 Secs	Steady State	Unit
Drain–Source Voltage	V_{DS}	–20		V
Gate–Source Voltage	V_{GS}	± 12		V
Continuous Drain Current ($T_J = 150^\circ\text{C}$) (Note 1) $T_A = 25^\circ\text{C}$ $T_A = 85^\circ\text{C}$	I_D	± 5.3 ± 3.8	± 3.9 ± 2.8	A
Pulsed Drain Current	I_{DM}	± 20		A
Continuous Source Current (Note 1)	I_S	–2.1	–1.1	A
Maximum Power Dissipation (Note 1) $T_A = 25^\circ\text{C}$ $T_A = 85^\circ\text{C}$	P_D	2.5 1.3	1.3 0.7	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	–55 to +150		$^\circ\text{C}$

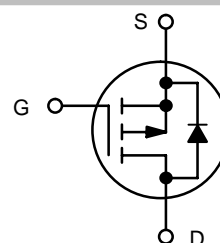
1. Surface Mounted on 1" x 1" FR4 Board.



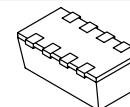
ON Semiconductor®

<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
–20 V	46 m Ω @ –4.5 V	–3.9 A

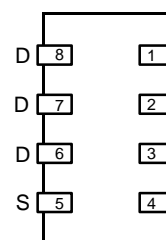


P-Channel MOSFET

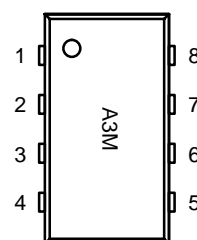


**ChipFET
CASE 1206A
Style 1**

PIN CONNECTIONS



MARKING DIAGRAM



A3 = Specific Device Code
M = Month Code

ORDERING INFORMATION

Device	Package	Shipping†
NTHS5441T1	ChipFET	3000/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 CHARACTERISTICS

Characteristic	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient (Note 2) $t \leq 5$ sec Steady State	R_{thJA}	40 80	50 95	$^{\circ}\text{C/W}$
Maximum Junction-to-Foot (Drain) Steady State	R_{thJF}	15	20	$^{\circ}\text{C/W}$

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

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$	-0.6	-	1.2	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 12 \text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	-1.0	μA
		$V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 85^{\circ}\text{C}$	-	-	-5.0	
On-State Drain Current (Note 3)	$I_{D(on)}$	$V_{DS} \leq -5.0 \text{ V}, V_{GS} = -4.5 \text{ V}$	-20	-	-	A
Drain-Source On-State Resistance (Note 3)	$r_{DS(on)}$	$V_{GS} = -3.6 \text{ V}, I_D = -3.7 \text{ A}$ $V_{GS} = -4.5 \text{ V}, I_D = -3.9 \text{ A}$	- -	0.050 0.046	0.06 -	Ω
		$V_{GS} = -2.5 \text{ V}, I_D = -3.1 \text{ A}$	-	0.070	0.083	
Forward Transconductance (Note 3)	g_{fs}	$V_{DS} = -10 \text{ V}, I_D = -3.9 \text{ A}$	-	12	-	mhos
Diode Forward Voltage (Note 3)	V_{SD}	$I_S = -2.1 \text{ A}, V_{GS} = 0 \text{ V}$	-	-0.8	-1.2	V

Dynamic (Note 4)

Total Gate Charge	Q_g	$V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V}, I_D = -3.9 \text{ A}$	-	9.7	22	nC
Gate-Source Charge	Q_{gs}		-	1.2	-	
Gate-Drain Charge	Q_{gd}		-	3.6	-	
Input Capacitance	C_{iss}	$V_{DS} = -5.0 \text{ Vdc}, V_{GS} = 0 \text{ Vdc}, f = 1.0 \text{ MHz}$	-	710	-	pF
Output Capacitance	C_{oss}		-	400	-	
Reverse Transfer Capacitance	C_{rss}		-	140	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10 \text{ V}, R_L = 10 \Omega$ $I_D \cong -1.0 \text{ A}, V_{GEN} = -4.5 \text{ V}, R_G = 6 \Omega$	-	14	30	ns
Rise Time	t_r		-	22	55	
Turn-Off Delay Time	$t_{d(off)}$		-	42	100	
Fall Time	t_f		-	35	70	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -1.1 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$	-	30	60	

2. Surface Mounted on 1" x 1" FR4 Board.

3. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.

4. Guaranteed by design, not subject to production testing.

TYPICAL ELECTRICAL CHARACTERISTICS

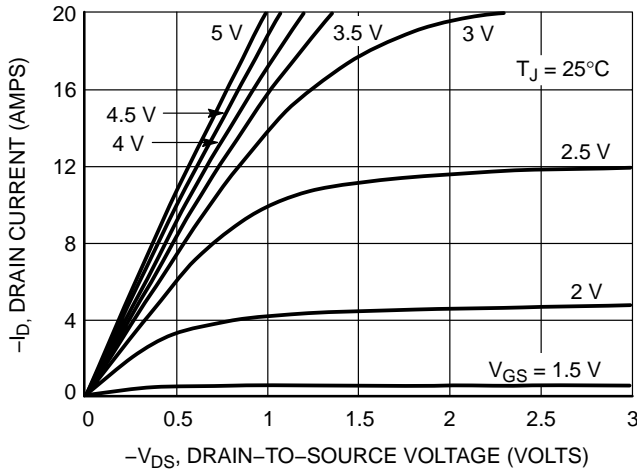


Figure 1. On-Region Characteristics

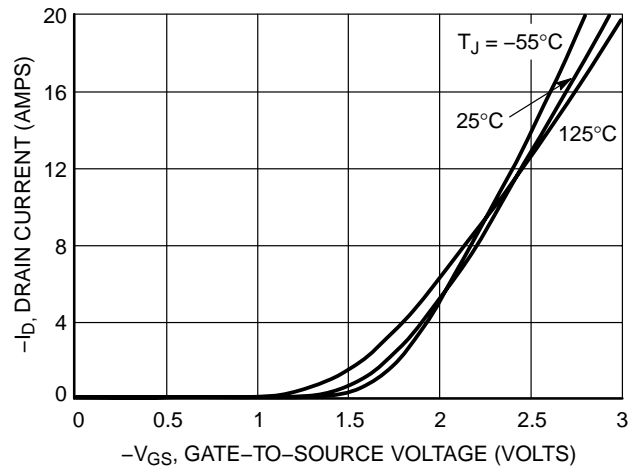


Figure 2. Transfer Characteristics

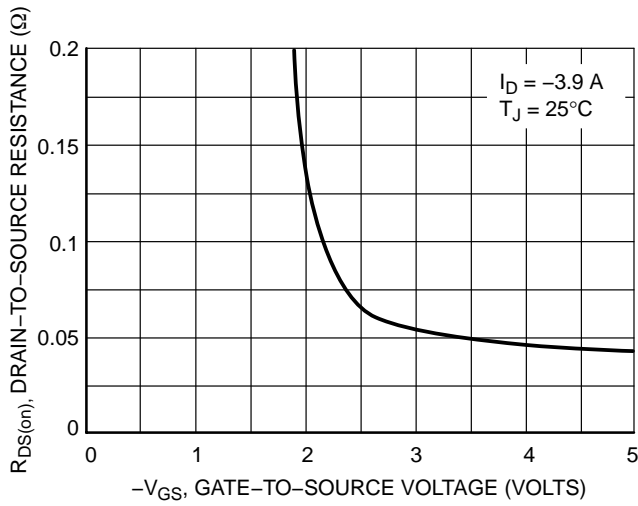


Figure 3. On-Resistance versus Gate-to-Source Voltage

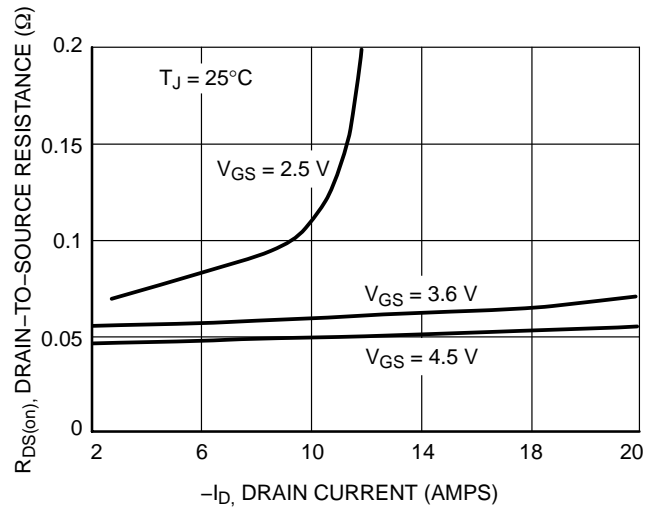


Figure 4. On-Resistance versus Drain Current and Gate Voltage

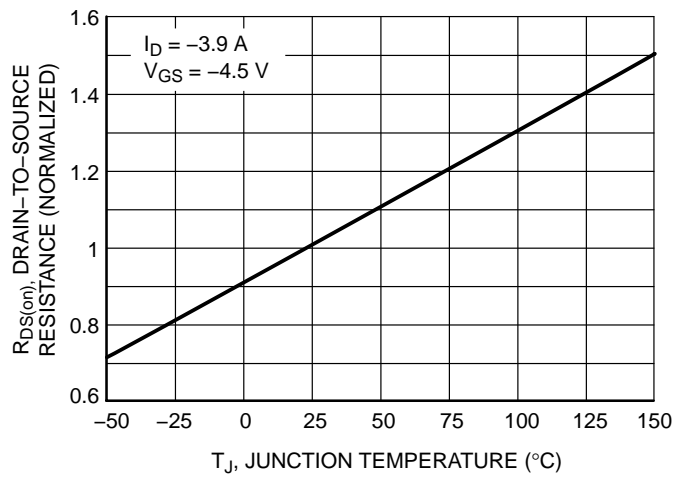


Figure 5. On-Resistance Variation with Temperature

TYPICAL ELECTRICAL CHARACTERISTICS

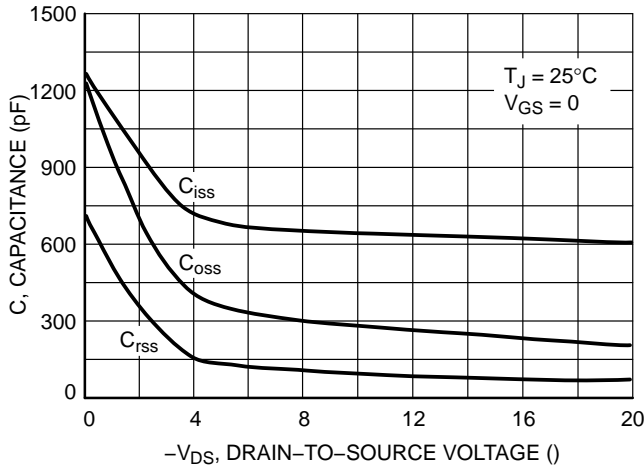


Figure 6. Capacitance Variation

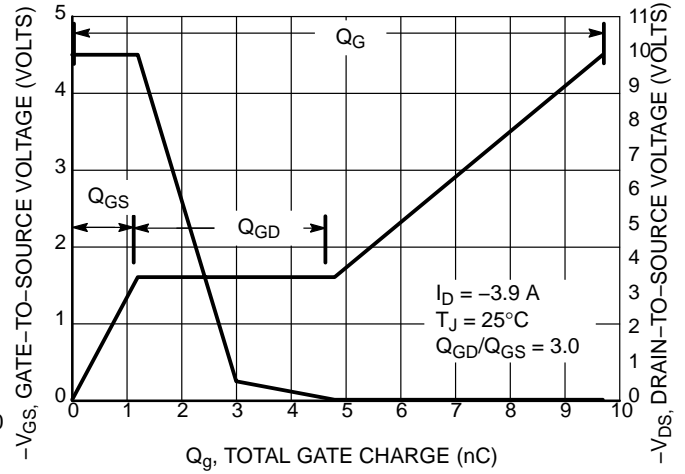


Figure 7. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

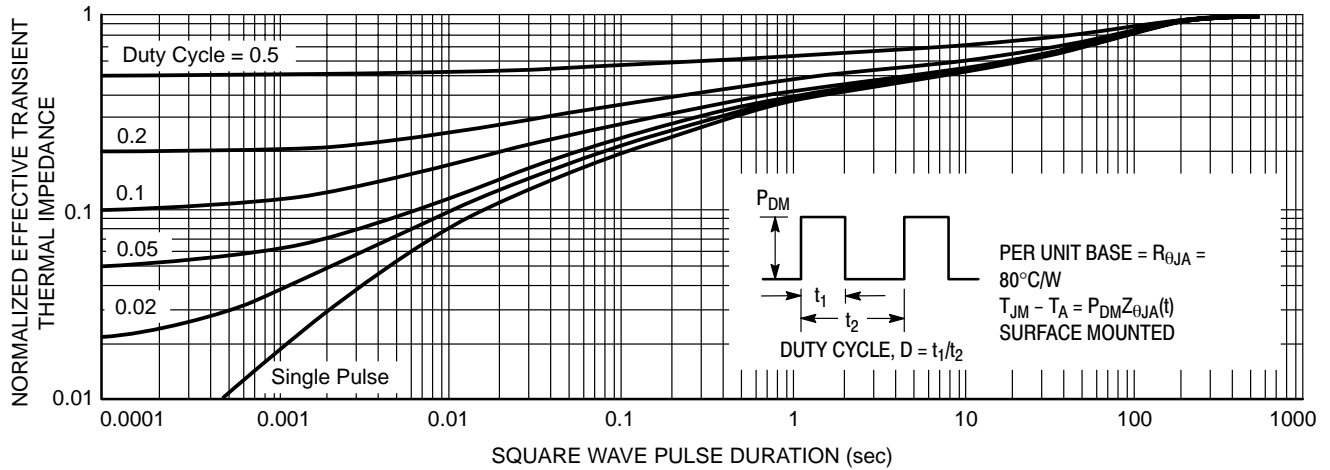


Figure 8. Normalized Thermal Transient Impedance, Junction-to-Ambient

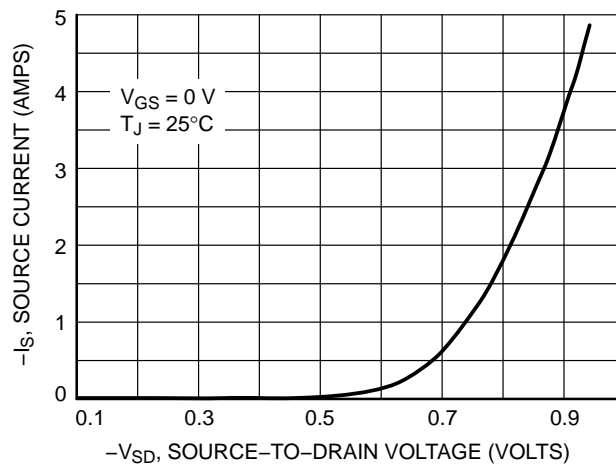
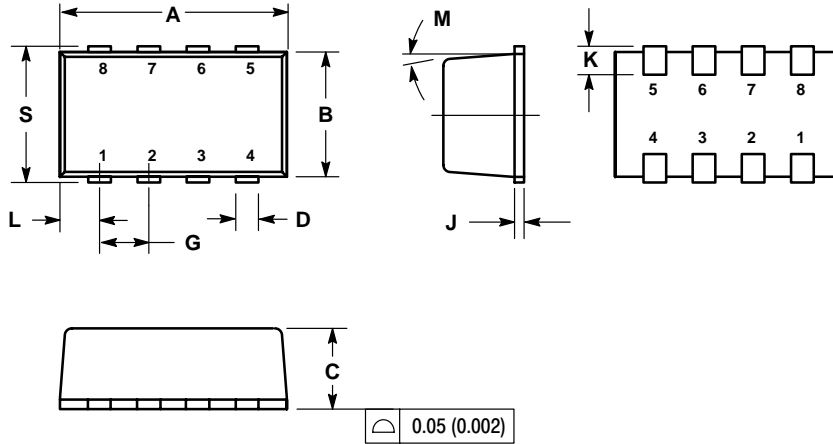


Figure 9. Diode Forward Voltage versus Current

NTHS5441

PACKAGE DIMENSIONS

ChipFET™
CASE 1206A-03
ISSUE E



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MOLD GATE BURRS SHALL NOT EXCEED 0.13 MM PER SIDE.
4. LEADFRAME TO MOLDED BODY OFFSET IN HORIZONTAL AND VERTICAL SHALL NOT EXCEED 0.08 MM.
5. DIMENSIONS A AND B EXCLUSIVE OF MOLD GATE BURRS.
6. NO MOLD FLASH ALLOWED ON THE TOP AND BOTTOM LEAD SURFACE.
7. 1206A-01 AND 1206A-02 OBSOLETE. NEW STANDARD IS 1206A-03.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.95	3.10	0.116	0.122
B	1.55	1.70	0.061	0.067
C	1.00	1.10	0.039	0.043
D	0.25	0.35	0.010	0.014
G	0.65 BSC		0.025 BSC	
J	0.10	0.20	0.004	0.008
K	0.28	0.42	0.011	0.017
L	0.55 BSC		0.022 BSC	
M	5 ° NOM		5 ° NOM	
S	1.80	2.00	0.072	0.080

STYLE 1:

- PIN 1: DRAIN
2: DRAIN
3: DRAIN
4: GATE
5: SOURCE
6: DRAIN
7: DRAIN
8: DRAIN

SOLDER FOOTPRINTS*

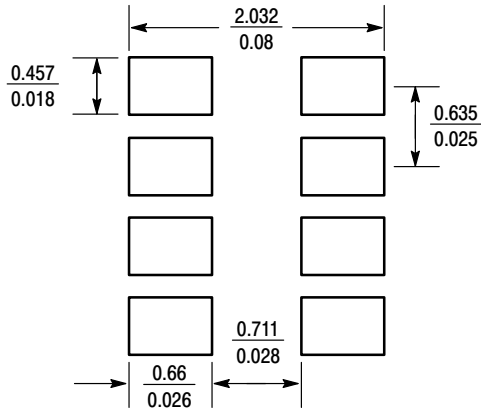


Figure 10.

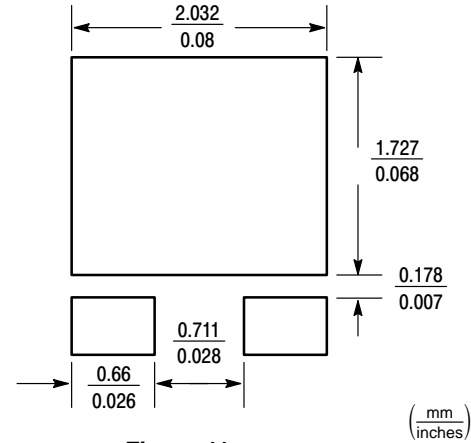



Figure 11.

*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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