

NTHD5904T1

Power MOSFET Dual N-Channel

3.1 Amps, 20 Volts

Features

- Low $R_{DS(on)}$ for Higher Efficiency
- Logic Level Gate Drive
- Miniature ChipFET™ Surface Mount Package Saves Board Space

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	± 4.2	± 3.1	A
		± 3.0	± 2.2	
Pulsed Drain Current	I_{DM}	± 10		A
Continuous Source Current (Diode Conduction) (Note 1)	I_S	1.8	0.9	A
Maximum Power Dissipation (Note 1) $T_A = 25^\circ\text{C}$ $T_A = 85^\circ\text{C}$	P_D	2.1	1.1	W
		1.1	0.6	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150		$^\circ\text{C}$

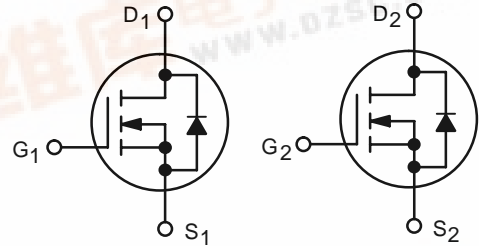
1. Surface Mounted on 1" x 1" FR4 Board.



ON Semiconductor®

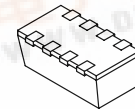
<http://onsemi.com>

DUAL N-CHANNEL
3.1 AMPS, 20 VOLTS
 $R_{DS(on)} = 75 \text{ m}\Omega$



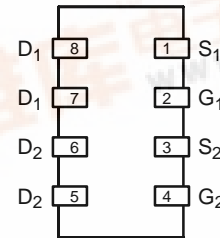
N-Channel MOSFET

N-Channel MOSFET

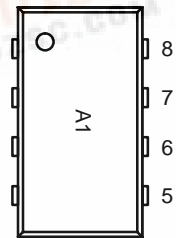


ChipFET
CASE 1206A
STYLE 2

PIN CONNECTIONS



MARKING DIAGRAM



A1 = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping
NTHD5904T1	ChipFET	3000/Tape & Reel



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THERMAL CHARACTERISTICS

Characteristic	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient (Note 2) t ≤ 5 sec Steady State	R _{thJA}	50 90	60 110	°C/W
Maximum Junction-to-Foot (Drain) Steady State	R _{thJF}	30	40	°C/W

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
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Static

Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.6	–	–	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V	–	–	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 16 V, V _{GS} = 0 V	–	–	1.0	μA
		V _{DS} = 16 V, V _{GS} = 0 V, T _J = 85°C	–	–	5.0	
On-State Drain Current (Note 3)	I _{D(on)}	V _{DS} ≥ 5.0 V, V _{GS} = 4.5 V	10	–	–	A
Drain-Source On-State Resistance (Note 3)	r _{DS(on)}	V _{GS} = 4.5 V, I _D = 3.1 A	–	0.065	0.075	Ω
		V _{GS} = 2.5 V, I _D = 2.3 A	–	0.115	0.143	
Forward Transconductance (Note 3)	g _{fs}	V _{DS} = 10 V, I _D = 3.1 A	–	8.0	–	S
Diode Forward Voltage (Note 3)	V _{SD}	I _S = 0.9 A, V _{GS} = 0 V	–	0.8	1.2	V

Dynamic (Note 4)

Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 3.1 A	–	4.0	6.0	nC
Gate-Source Charge	Q _{gs}		–	0.6	–	
Gate-Drain Charge	Q _{gd}		–	1.3	–	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 10 Ω, I _D ≈ 1.0 A, V _{GEN} = 4.5 V, R _G = 6 Ω	–	12	18	ns
Rise Time	t _r		–	35	55	
Turn-Off Delay Time	t _{d(off)}		–	19	30	
Fall Time	t _f		–	9.0	15	
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 0.9 A, di/dt = 100 A/μs	–	40	80	

2. Surface Mounted on 1" x 1" FR4 Board.
3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

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TYPICAL ELECTRICAL CHARACTERISTICS

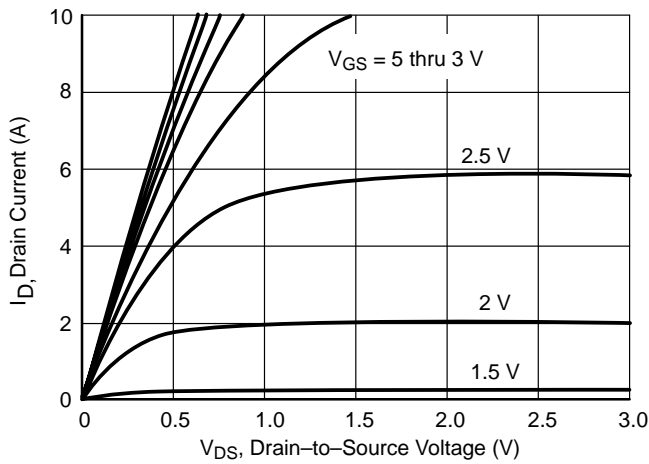


Figure 1. Output Characteristics

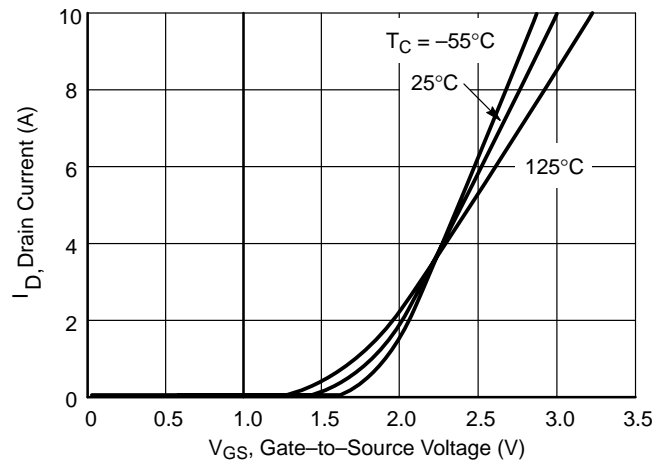


Figure 2. Transfer Characteristics

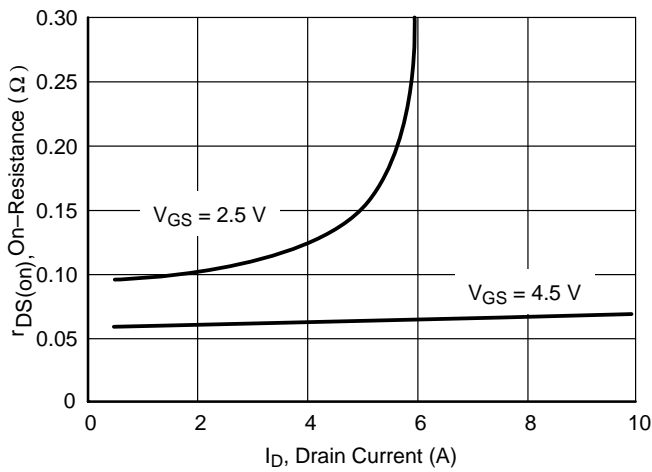


Figure 3. On-Resistance vs. Drain Current

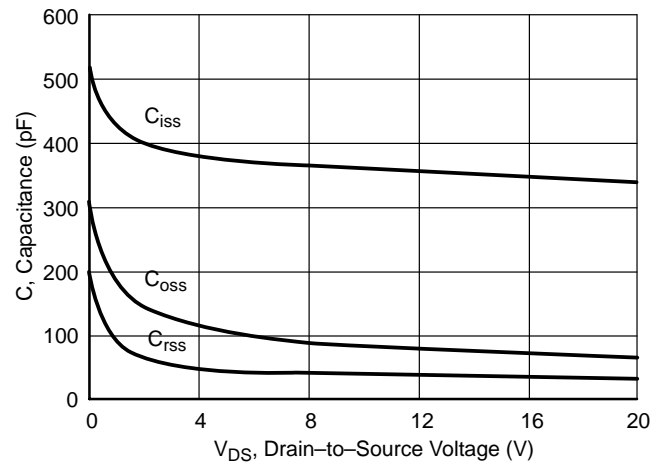


Figure 4. Capacitance

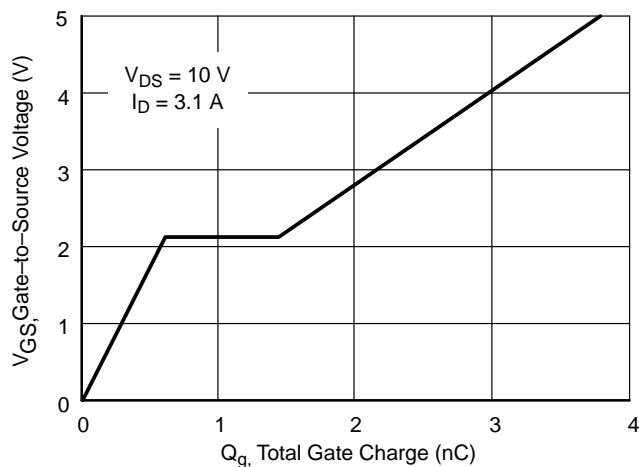


Figure 5. Gate Charge

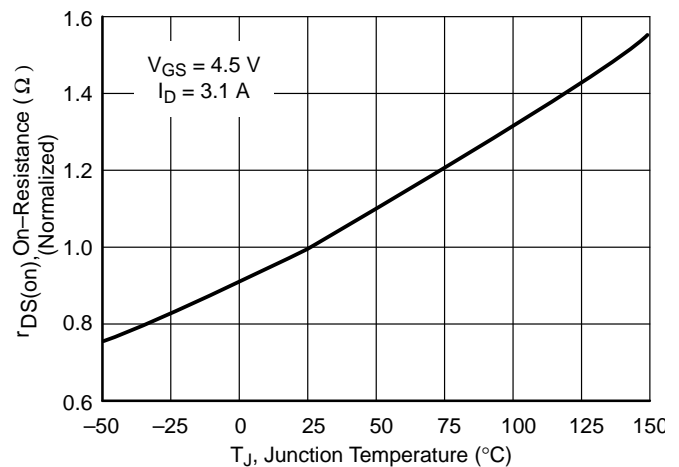


Figure 6. On-Resistance vs. Junction Temperature

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TYPICAL ELECTRICAL CHARACTERISTICS

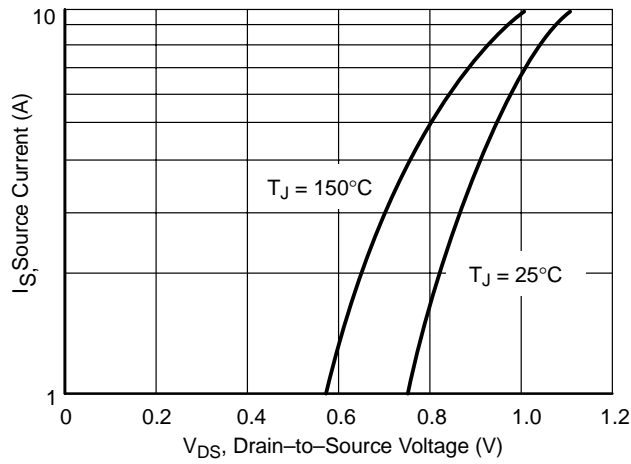


Figure 7. Source-Drain Diode Forward Voltage

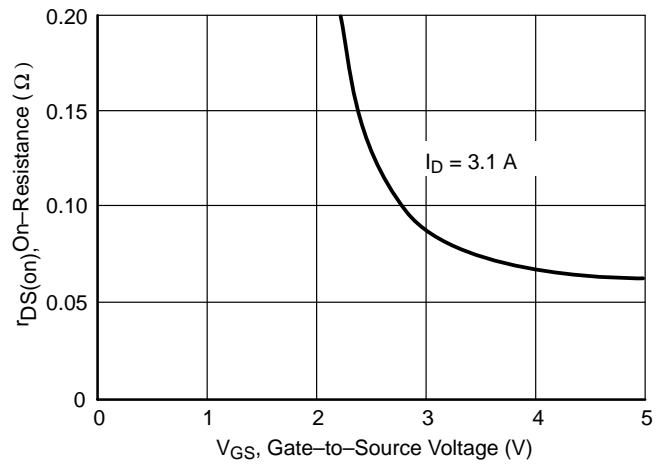


Figure 8. On-Resistance vs. Gate-to-Source Voltage

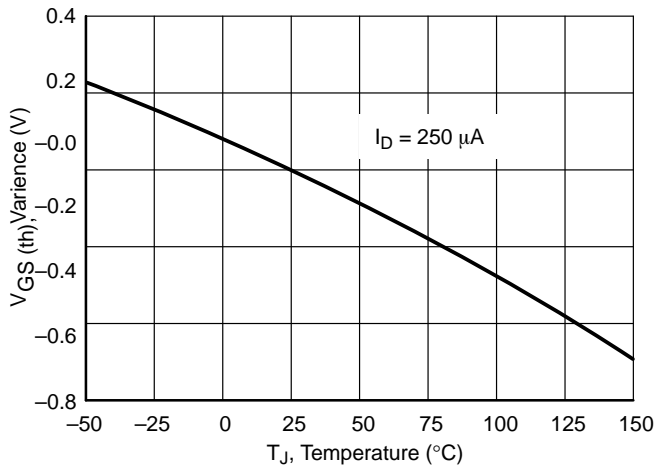


Figure 9. Threshold Voltage

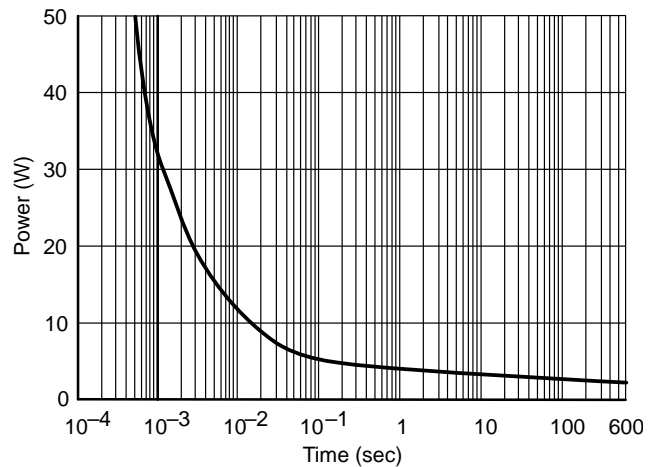


Figure 10. Single Pulse Power

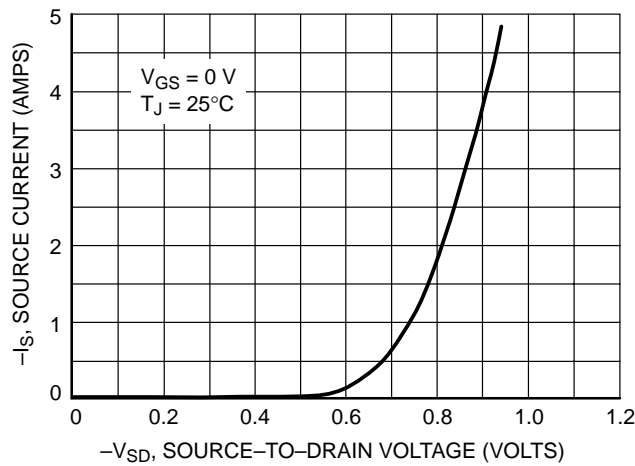


Figure 11. Diode Forward Voltage vs. Current

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TYPICAL ELECTRICAL CHARACTERISTICS

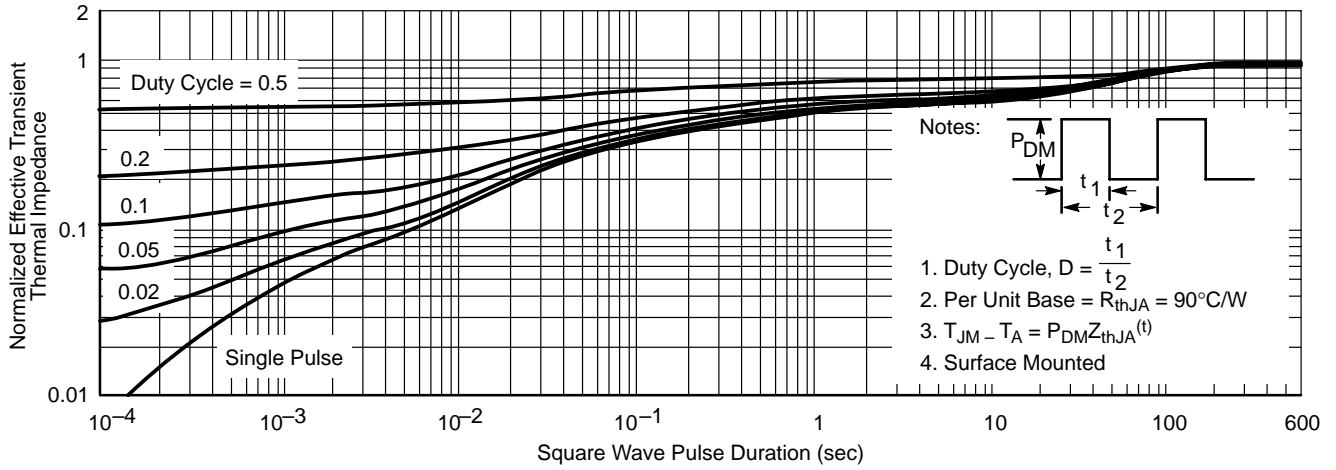


Figure 12. Normalized Thermal Transient Impedance, Junction-to-Ambient

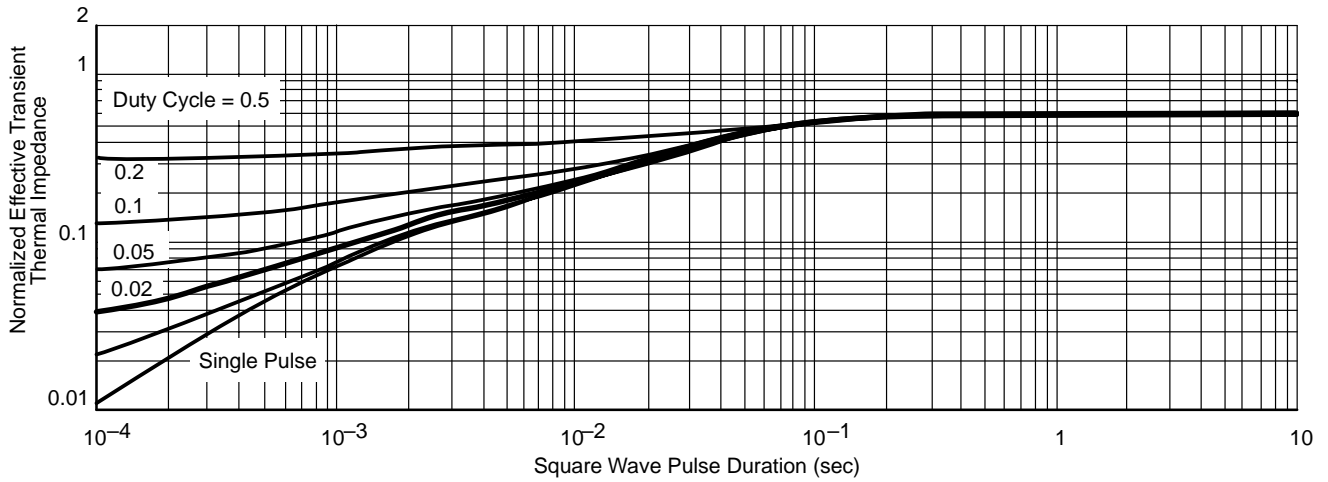


Figure 13. Normalized Thermal Transient Impedance, Junction-to-Foot

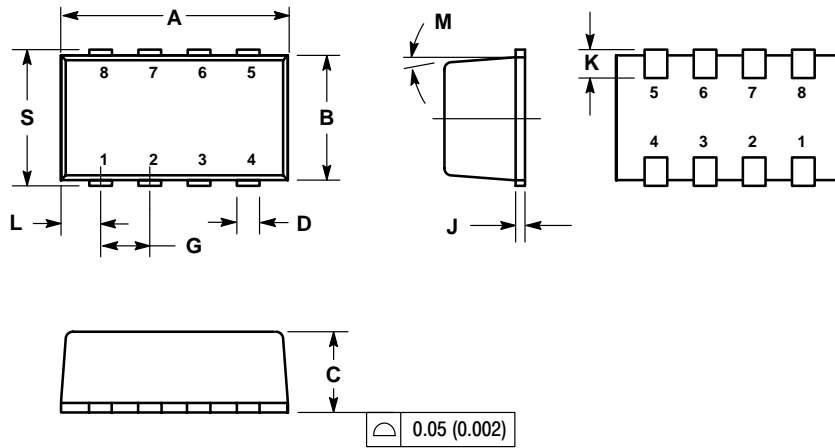
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Notes

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PACKAGE DIMENSIONS

ChipFET
CASE 1206A-03
ISSUE C



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 2:

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

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