

NTLMS4504N

Advance Information

Power MOSFET

28 A, 24 V N-Channel SO-8 Leadless

The SO-8LL (Leadless) package uses the power QFN package technology. It's footprint matches that of the standard SO-8 single die device. This Leadless SO-8 package provides low parasitic inductance compared to the standard SO-8 package allowing for higher frequency operation.

Features

- Planar HD3E Process for Fast Switching Performance.
- Body Diode for Low t_{rr} and Q_{rr} , Optimized for Synchronous Operation
- Low R_{DSon} to Minimize Conduction Loss
- Low C_{iss} to Minimize Driver Loss
- Optimized $Q_{dg} \times R_{SDon}$ (FOM) for Shootthrough Protection
- Low Gate Charge

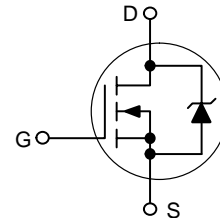
Product Summary

| Symbol | Value |
|-------------------|----------------|
| V_{DS} | 24 V |
| $R_{DSon} @ 10 V$ | 3.7 m Ω |
| Q_g | 24 nC |
| I_D | 28 A |
| Q_{gd} | 12 nC |

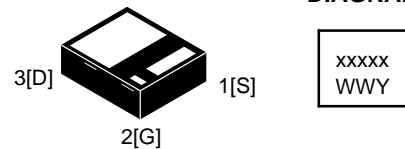


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MARKING DIAGRAM



SO-8 Leadless
CASE 751S

xxxxx = Specific Device Code
Y = Year
WW = Work Week

PIN ASSIGNMENT

| PIN | FUNCTION |
|-----|------------|
| 1 | S – SOURCE |
| 2 | G – GATE |
| 3 | D – DRAIN |

ORDERING INFORMATION

| Device | Package | Shipping |
|------------|---------------|------------------|
| NTLMS4504N | SO-8 Leadless | 2500 Tape & Reel |

This document contains information on a new product. Specifications and information herein are subject to change without notice.

NTLMS4504N

MAXIMUM RATINGS (T_J = 25°C Unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------|-----------------|
| Drain-to-Source Voltage | V _{DSS} | 24 | V _{dc} |
| Gate-to-Source Voltage – Continuous | V _{GS} | ±20 | V _{dc} |
| Drain Current | I _D Continuous @ T _A = 25°C (Note 1) | 18 | A |
| | I _D Continuous @ T _A = 25°C (Note 2) | 28 | A |
| | I _{DM} Single Pulse (t _p = 10 μs) (Note 4) | 74 | A |
| Maximum Power Dissipation (Steady State) @ T _A = 25°C (Note 1) Single Pulse (t _p = 10 Secs) T _A = 25°C (Note 2) | P _D | 2.4 | W |
| | P _D | 6.0 | W |
| Operating and Storage Temperature | T _J and T _{stg} | –55 to 150 | °C |
| Single Pulse Drain-to Source Avalanche Energy – Starting T _J = 25°C | E _{AS} | 220 | mJ |
| Thermal Resistance | R _{θJA} Junction-to-Ambient (Note 1) | 52 | °C/W |
| | R _{θJA} Junction-to-Ambient (Note 2) | 22 | |
| | R _{θJA} Junction-to-Ambient (Note 3) | 100 | |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 Secs | T _L | 260 | °C |

1. When surface mounted to an FR4 board using 1" pad size, (Cu Area 1.127 in²).
2. 1" pad (Cu Area 0.911 in²), t < 10 sec.
3. When surface mounted to an FR4 board using minimum recommended pad size, (Cu Area 0.412 in²).
4. Chip current capability limited by package.

NTLMS4504N

ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless otherwise specified)

| Characteristics | Symbol | Min. | Typ. | Max. | Unit | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------|--------------------------|-----------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-to-Source Breakdown Voltage (Note 5) (V _{GS} = 0 V _{dc} , I _D = 250 μA _{dc}) Temperature Coefficient (Positive) | V _{(br)DSS} | 24 – | 28 25 | – – | V _{dc} mV/°C | |
| Zero Gate Voltage Drain Current (V _{DS} = 20 V _{dc} , V _{GS} = 0 V _{dc}) (V _{DS} = 20 V _{dc} , V _{GS} = 0 V _{dc} , T _J = 150°C) | I _{DSS} | – – | – – | 0.8 10 | μA _{dc} | |
| Gate-Body Leakage Current (V _{GS} = ±20 V _{dc} , V _{DS} = 0 V _{dc}) | I _{GSS} | – | – | ±100 | nA _{dc} | |
| ON CHARACTERISTICS (Note 5) | | | | | | |
| Gate Threshold Voltage (Note 5) (V _{DS} = V _{GS} , I _D = 250 μA _{dc}) Threshold Temperature Coefficient (Negative) | V _{GS(th)} | 1.0 – | 1.5 –4.0 | 2.0 – | V _{dc} mV/°C | |
| Static Drain-to-Source On-Resistance (Note 5) (V _{GS} = 10 V _{dc} , I _D = 28 A _{dc}) (V _{GS} = 4.5 V _{dc} , I _D = 15 A _{dc}) | R _{DS(on)} | – – | 3.7 4.6 | 5 6.2 | mΩ | |
| Forward Transconductance (Note 5) (V _{DS} = 10 V _{dc} , I _D = 15 A _{dc}) | g _{FS} | – | 80 | – | Mhos | |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | (V _{DS} = 20 V _{dc} , V _{GS} = 0 V f = 1 MHz) | C _{iss} | – | 3320 | 3652 | pF |
| Output Capacitance | | C _{oss} | – | 1420 | 1562 | |
| Transfer Capacitance | | C _{rss} | – | 135 | 160 | |
| SWITCHING CHARACTERISTICS (Note 6) | | | | | | |
| Turn-On Delay Time | (V _{GS} = 4.5 V _{dc} , V _{DD} = 10 V _{dc} I _D = 28 A _{dc} , R _G = 2.5 Ω) | t _{d(on)} | – | 14 | 18 | ns |
| Rise Time | | t _r | – | 85 | 109 | |
| Turn-Off Delay Time | | t _{d(off)} | – | 25 | 30 | |
| Fall Time | | t _f | – | 15 | 20 | |
| Gate Charge | (V _{GS} = 4.5 V _{dc} , I _D = 28 A _{dc} V _{DS} = 10 V _{dc}) (Note 5) | Q _{T(g)} | – | 24 | 26.5 | nC |
| | | Q _{1(gs)} | – | 5.5 | – | |
| | | Q _{2(gd)} | – | 12 | – | |
| | | Q _{sw} | – | TBD | – | |
| | | Q _{oss} | – | TBD | – | |
| SOURCE-DRAIN DIODE CHARACTERISTICS | | | | | | |
| Forward On-Voltage | (I _S = 14 A _{dc} , V _{GS} = 0 V _{dc}) (Note 5) (I _S = 1.5 A _{dc} , V _{GS} = 0 V _{dc} , T _J = 150°C) | V _{SD} | – | 0.82 | 1.2 | V _{dc} |
| | | – | – | 0.8 | – | |
| | | – | – | – | – | |
| Reverse Recovery Time | (I _S = 14 A _{dc} , V _{GS} = 0 V _{dc} , V _{DD} = 20 V, dI _S /dt = 100 A/μs) (Note 5) | t _{rr} | – | 33 | 46 | ns |
| | | t _a | – | 18.5 | – | |
| | | t _b | – | 15 | – | |
| Reverse Recovery Stored Charge | | Q _{RR} | – | 0.020 | – | μC |

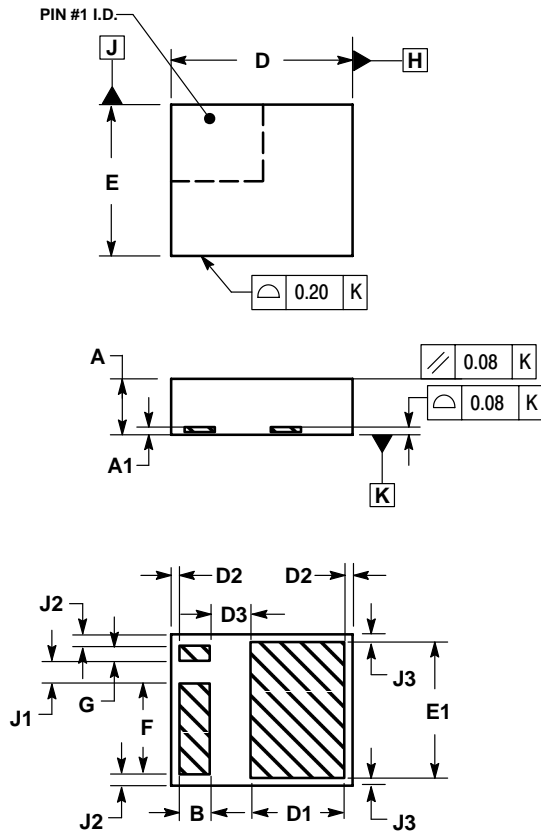
5. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2%.

6. Switching characteristics are independent of operating junction temperatures.

NTLMS4504N


PACKAGE DIMENSIONS

SO-8 Leadless
CASE 751S-02
ISSUE A



- NOTES:
1. DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETER.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 1.750 | 1.950 |
| A1 | 0.254 REF | |
| B | 0.900 | 1.100 |
| D | 6.000 BSC | |
| D1 | 3.046 | 3.246 |
| D2 | 0.154 | 0.354 |
| D3 | 1.246 | 1.446 |
| E | 5.000 BSC | |
| E1 | 4.392 | 4.592 |
| F | 2.940 | 3.140 |
| G | 0.400 | 0.600 |
| J1 | 0.680 | 0.880 |
| J2 | 0.250 | 0.450 |
| J3 | 0.154 | 0.354 |

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