# SPN2054
# N-Channel Enhancement Mode MOSFET

## DESCRIPTION

The SPN2054 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density , DMOS trench technology.

This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application, such as DC/DC converter and Desktop computer power management.

The package is universally preferred for commercial industrial surface mount applications

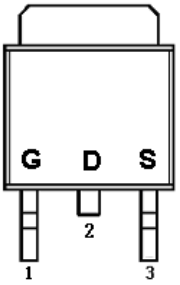
## APPLICATIONS

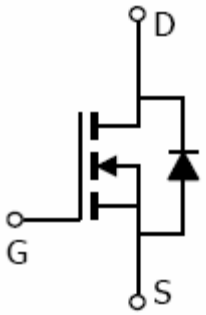
- Power Management in Desktop Computer
- DC/DC Converter
- LCD Display inverter

## FEATURES

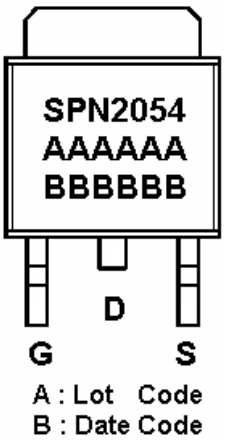
- 20V/12A,$R_{DS(ON)}$=40mΩ@$V_{GS}$=10V
- 20V/7A,$R_{DS(ON)}$=45mΩ@$V_{GS}$=4.5V
- 20V/4A,$R_{DS(ON)}$=50mΩ@$V_{GS}$=2.5V
- 20V/2A,$R_{DS(ON)}$=60mΩ@$V_{GS}$=1.8V
- Super high density cell design for extremely low $R_{DS\ (ON)}$
- Exceptional on-resistance and maximum DC current capability
- TO-252-2L package design

## PIN CONFIGURATION(TO-252-2L)




## PART MARKING



# SPN2054
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**PIN DESCRIPTION**

| Pin | Symbol | Description |
|---|---|---|
| 1 | G | Gate |
| 2 | D | Drain |
| 3 | S | Source |

**ORDERING INFORMATION**

| Part Number | Package | Part Marking |
|---|---|---|
| SPN2054T252RGB | TO-252-2L | SPN2054 |

※ Week Code : A ~ Z( 1 ~ 26 ) ; a ~ z( 27 ~ 52 )
※ SPN2054T252RGB : Tape Reel ; Pb – Free ; Halogen - Free

**ABSOULTE MAXIMUM RATINGS**
($T_A$=25℃ Unless otherwise noted)

| Parameter | | Symbol | Typical | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 20 | V |
| Gate –Source Voltage | | $V_{GSS}$ | ±12 | V |
| Continuous Drain Current($T_J$=150℃) | $T_A$=25℃ | $I_D$ | 12 | A |
| | $T_A$=70℃ | | 8 | |
| Pulsed Drain Current | | $I_{DM}$ | 20 | A |
| Continuous Source Current(Diode Conduction) | | $I_S$ | 12 | A |
| Power Dissipation | $T_A$=25℃ | $P_D$ | 40 | W |
| | $T_A$=70℃ | | 20 | |
| Operating Junction Temperature | | $T_J$ | -55/150 | ℃ |
| Storage Temperature Range | | $T_{STG}$ | -55/150 | ℃ |
| Thermal Resistance-Junction to Ambient | | $R_{\theta JA}$ | 105 | ℃/W |

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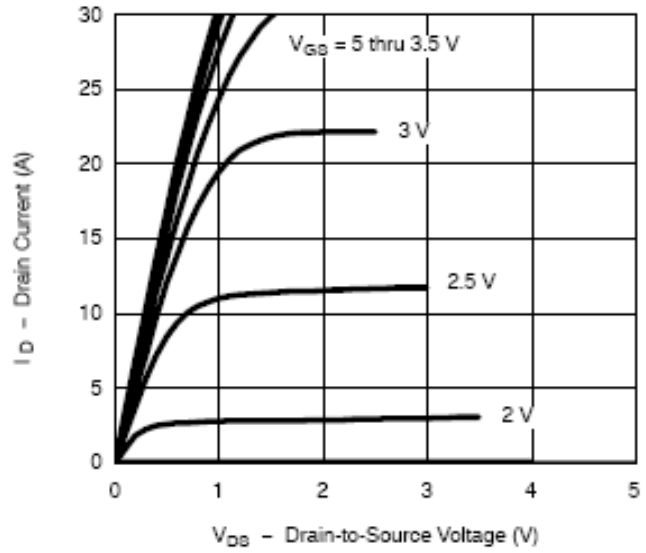
# N-Channel Enhancement Mode MOSFET

**ELECTRICAL CHARACTERISTICS**
($T_A$=25℃ Unless otherwise noted)

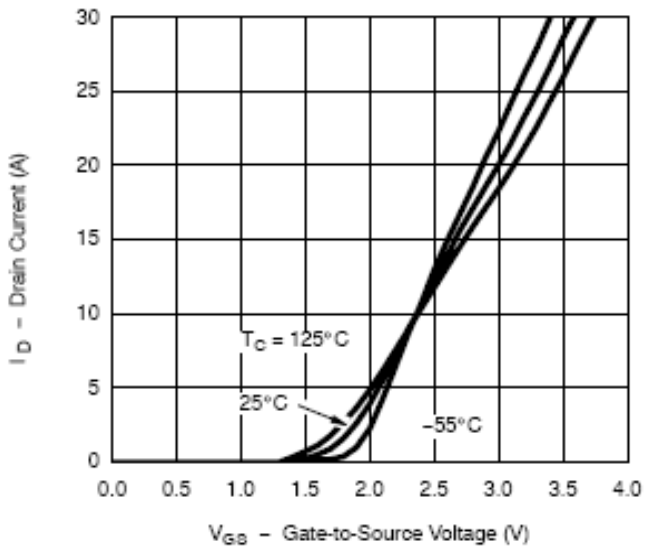
| Parameter | Symbol | Conditions | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V,$I_D$=250uA | 20 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 0.36 | | 1.0 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{DS}$=0V,$V_{GS}$=±12V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V,$V_{GS}$=0V | | | 1 | uA |
| | | $V_{DS}$=20V,$V_{GS}$=0V $T_J$=55℃ | | | 5 | |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V,$I_D$=12A | | 0.031 | 0.040 | Ω |
| | | $V_{GS}$=4.5V,$I_D$=7A | | 0.035 | 0.045 | |
| | | $V_{GS}$=2.5V,$I_D$=4A | | 0.040 | 0.050 | |
| | | $V_{GS}$=1.8V,$I_D$=2A | | 0.048 | 0.060 | |
| Forward Transconductance | gfs | $V_{DS}$=5V,$I_D$=-3.6A | | 10 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=7A,$V_{GS}$=0V | | 0.95 | 1.2 | V |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=10V,$V_{GS}$=4.5V $I_D$=12A | | 4.8 | 8 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.0 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.0 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=10V,$V_{GS}$=0V f=1MHz | | 485 | | pF |
| Output Capacitance | $C_{oss}$ | | | 85 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 40 | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD}$=10V,$R_L$=6Ω $I_D$=1.0A,$V_{GEN}$=4.5V $R_G$=6Ω | | 8 | 14 | nS |
| | $t_r$ | | | 12 | 18 | |
| Turn-Off Time | $t_{d(off)}$ | | | 30 | 35 | |
| | $t_f$ | | | 12 | 16 | |

**TYPICAL CHARACTERISTICS**

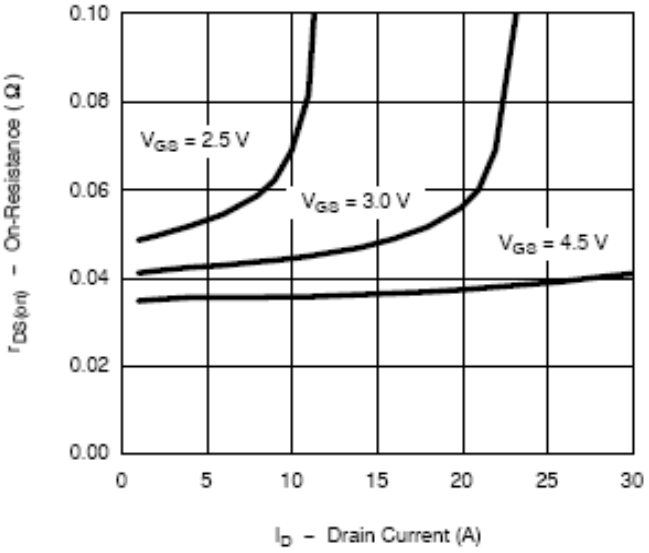
Output Characteristics



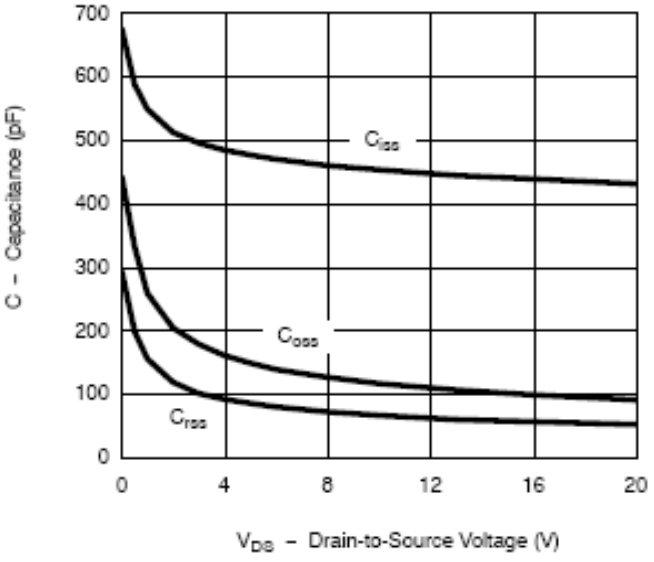

Transfer Characteristics



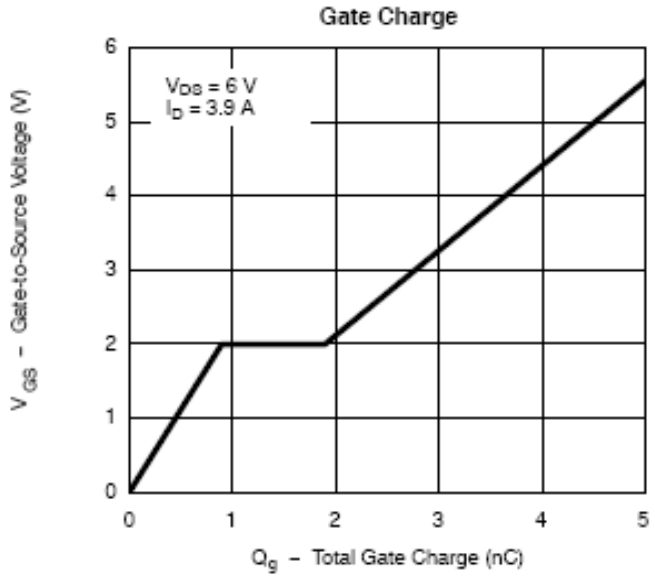

On-Resistance vs. Drain Current

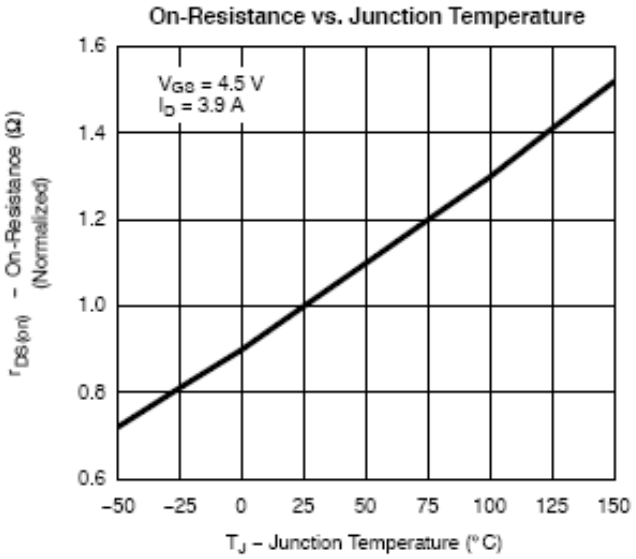


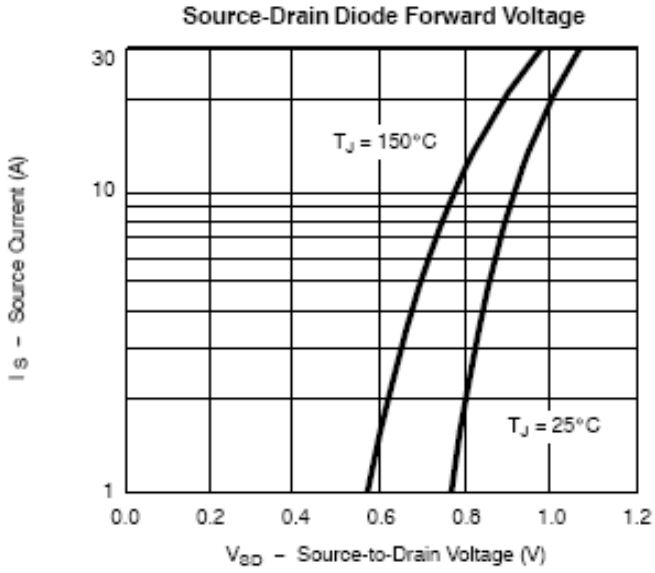

Capacitance

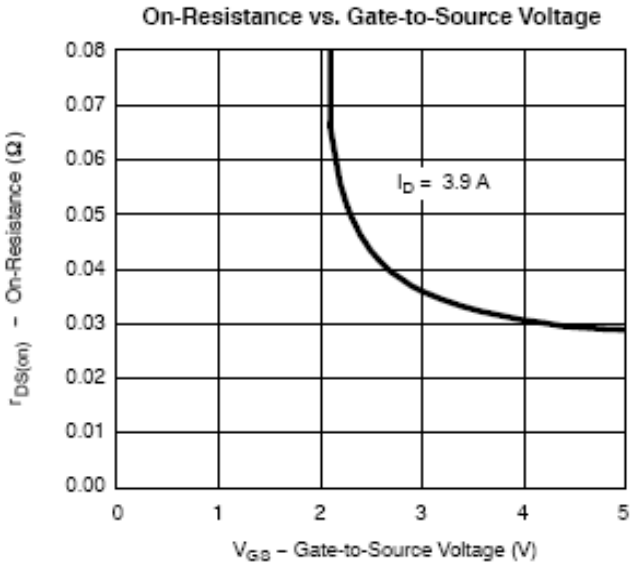


**TYPICAL CHARACTERISTICS**



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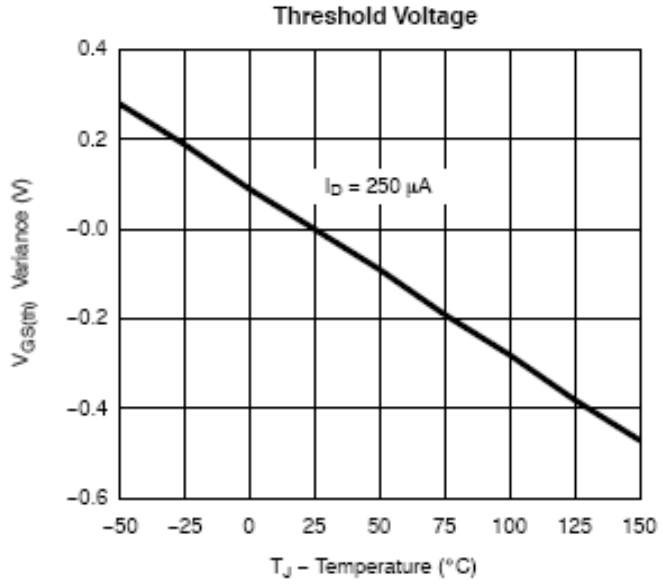


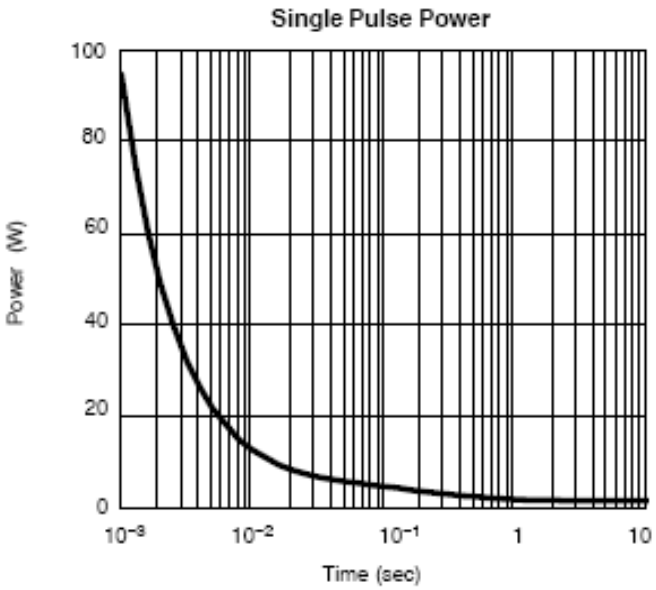


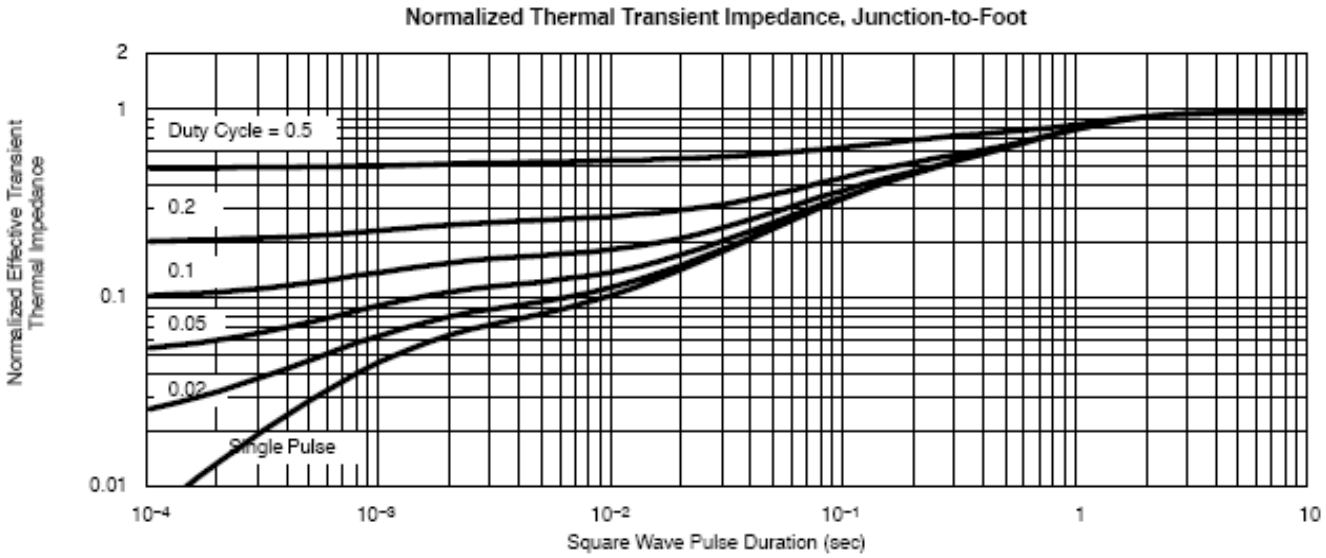

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