

DESCRIPTION

These N-Channel enhancement mode powerfield effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

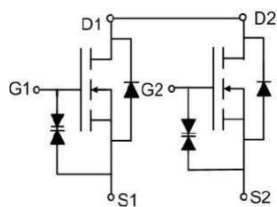
GENERAL FEATURES

- $V_{DS}=20V$, $I_D=9.5A$
 $R_{DS(ON)}(Typ.)=7.6m\Omega$ @ $V_{GS}=4.5V$
 $R_{DS(ON)}(Typ.)=11m\Omega$ @ $V_{GS}=2.5V$
- Fast switching
- G-S ESD protection diode embedded withstand high
- Green Device Available

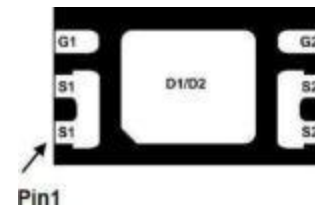
APPLICATION

- MB/VGA/Voore
- Portable Equipment
- Battery Powered System
- Load Switch
- LCD Display inverter

PINOUT



Schematic diagram



DFN2X3 & Pin Assignment

ORDERING INFORMATION

| Part Number | Storage Temperature | Package | Devices Per Reel |
|-------------|---------------------|---------|------------------|
| MX8204 | -55°C to 150°C | DFN2X3 | - |

ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|----------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Drain Current-Continuous ($T_C=25^\circ C$) | I_D | 9.5 | A |
| Drain Current-Continuous ($T_C=70^\circ C$) | I_D | 7.6 | A |
| Pulsed Drain Current ^(Note2) | I_{DM} | 60 | A |
| Maximum Power Dissipation ($T_A=25^\circ C$) ^(Note1) | P_D | 1.56 | W |
| Maximum Power Dissipation ($T_A=70^\circ C$) ^(Note1) | P_D | 1 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ C$ |

THERMAL RESISTANCE

| | | | |
|--|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient ^(Note1) | $R_{\theta JA}$ | 80 | $^\circ C/W$ |
|--|-----------------|----|--------------|

Note 1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, $t \leq 10s$.

Note 2. The data tested by pulsed, pulse width $\leq 10\mu s$, duty cycle $\leq 1\%$



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

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---------------|---|------|-----|----------|------------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$ | 20 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=16V, V_{GS}=0V$ | - | - | 1 | μA |
| | | $V_{DS}=16V, V_{GS}=0V, T_J=55^{\circ}\text{C}$ | - | - | 5 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 12V, V_{DS}=0V$ | - | - | ± 10 | μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 0.45 | - | 1.5 | V |
| Drain-Source On-State Resistance ^(Note1) | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=5A$ | 6.3 | 7.6 | 9 | m Ω |
| | | $V_{GS}=4.0V, I_D=5A$ | 6.5 | 8 | 9.5 | m Ω |
| | | $V_{GS}=3.7V, I_D=5A$ | 6.7 | 8.2 | 10 | m Ω |
| | | $V_{GS}=3.1V, I_D=5A$ | 7 | 9 | 11.2 | m Ω |
| | | $V_{GS}=2.5V, I_D=5A$ | 8 | 11 | 13.5 | m Ω |
| Forward Trans Conductance | g_{fs} | $V_{DS}=5V, I_D=5.5A$ | - | 38 | - | S |

Dynamic Characteristics

| | | | | | | |
|------------------------------|--------------|--|---|------|---|----|
| Input Capacitance | C_{iss} | $V_{DS}=10V, V_{GS}=0V, F=1.0\text{MHz}$ | - | 1647 | - | pF |
| Output Capacitance | C_{oss} | | - | 170 | - | pF |
| Reverse Transfer Capacitance | C_{rss} | | - | 148 | - | pF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}=15V, V_{GS}=4.5V, R_G=6\Omega, I_D=5.5A$ | - | 10 | - | nS |
| Turn-on Rise Time | t_r | | - | 39.5 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 65 | - | nS |
| Turn-Off Fall Time | t_f | | - | 30 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=15V, I_D=5.5A, V_{GS}=4.5V$ | - | 22 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 3.1 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 8.2 | - | nC |

Drain-Source Diode Characteristics

| | | | | | | |
|--|----------|---|---|---|-----|---|
| Diode Forward Voltage ^(Note2) | V_{SD} | $I_S=9.5A, V_{GS}=0V, T_J=25^{\circ}\text{C}$ | - | - | 1.2 | V |
| Maximum Body-Diode Continuous Current ^(Note1) | | | | | 9.5 | A |

Note 1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, $t \leq 10s$.

Note 2. The data tested by pulsed , pulse width $\leq 10\mu s$, duty cycle $\leq 1\%$



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Output Characteristics

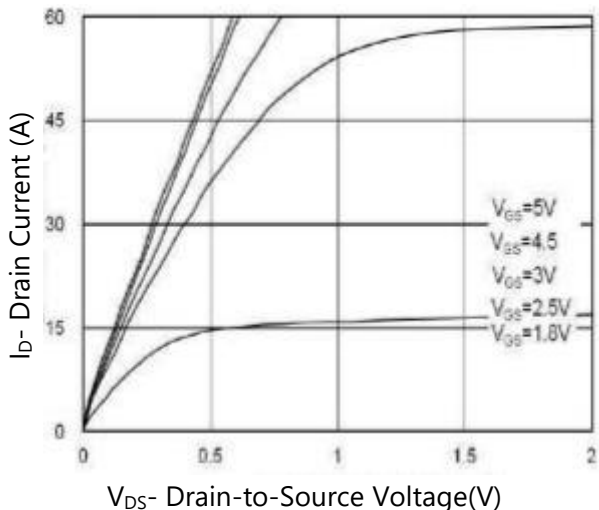


Figure 2. On-Resistance vs. Gate-Source

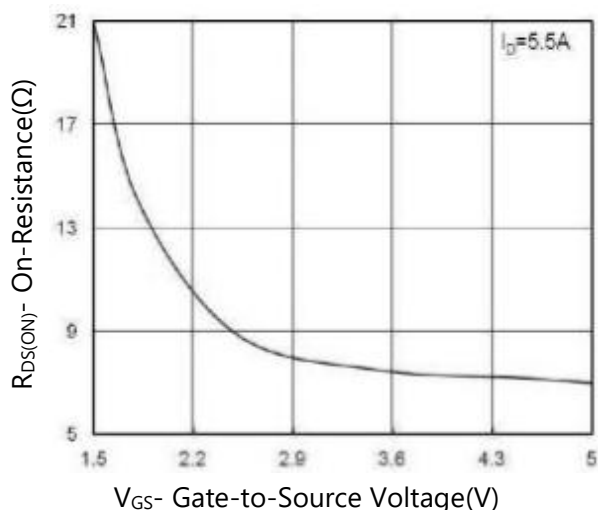


Figure 3. Source-Drain Diode Forward Voltage

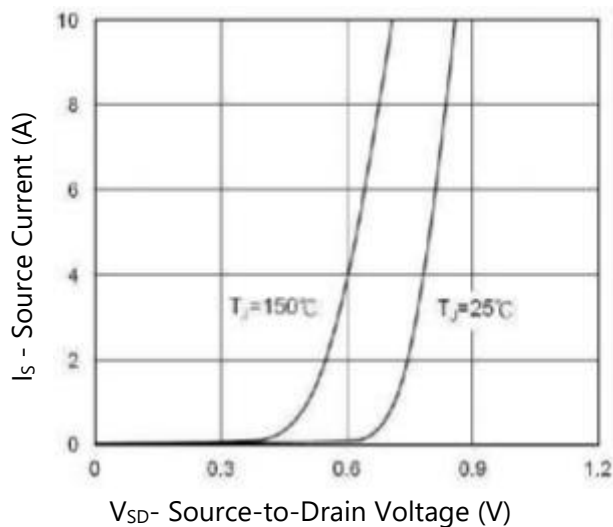


Figure 4. Gate-Charge Characteristics

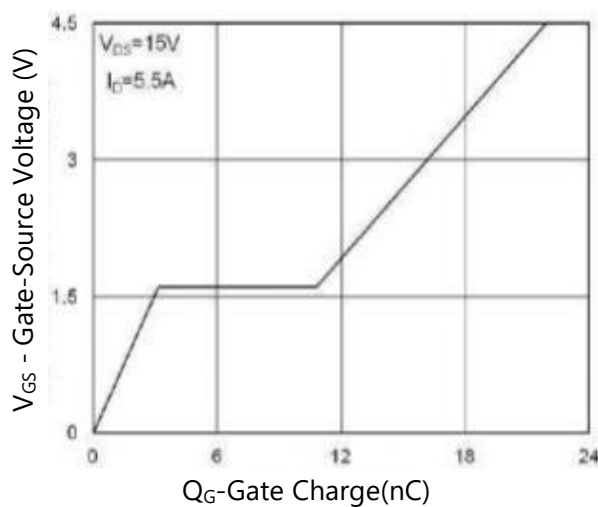


Figure 5. $V_{GS(th)}$ vs. Junction Temperature

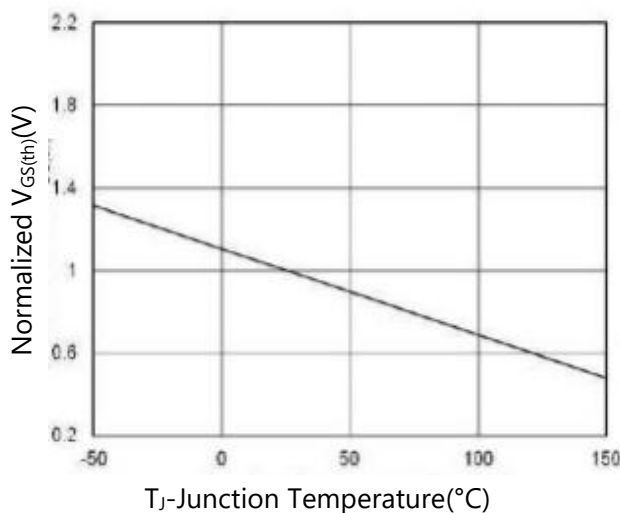
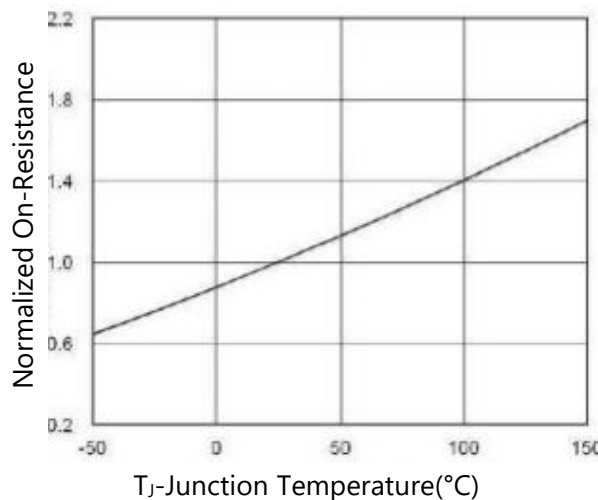


Figure 6. $R_{DS(ON)}$ vs. Junction Temperature





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Capacitance

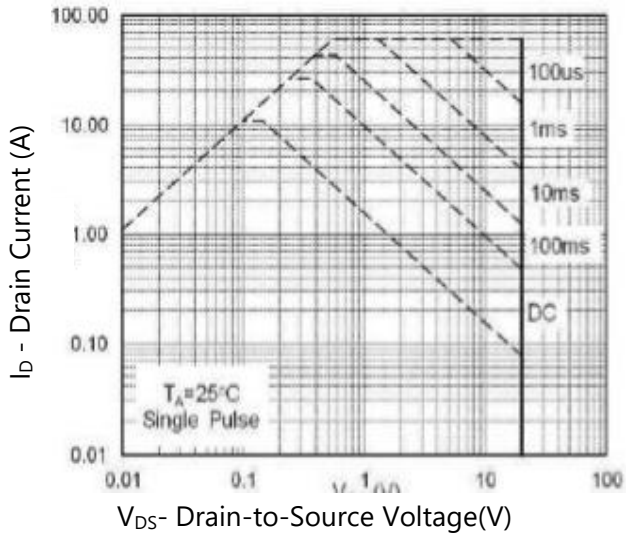


Figure 8. Safe Operating Area

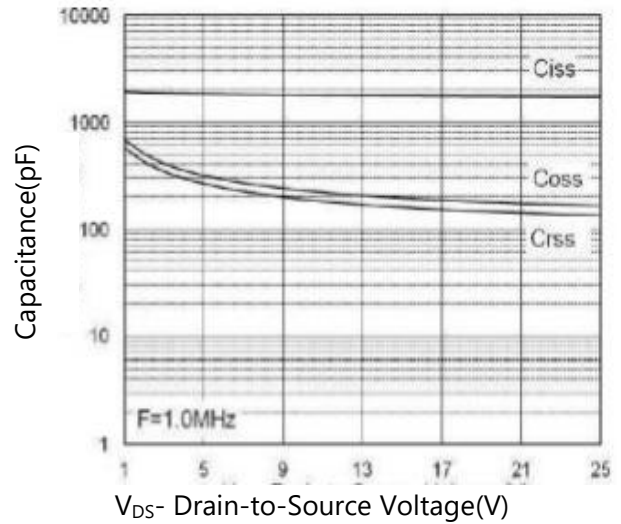


Figure 9. Normalized Maximum Thermal Transient Impedance

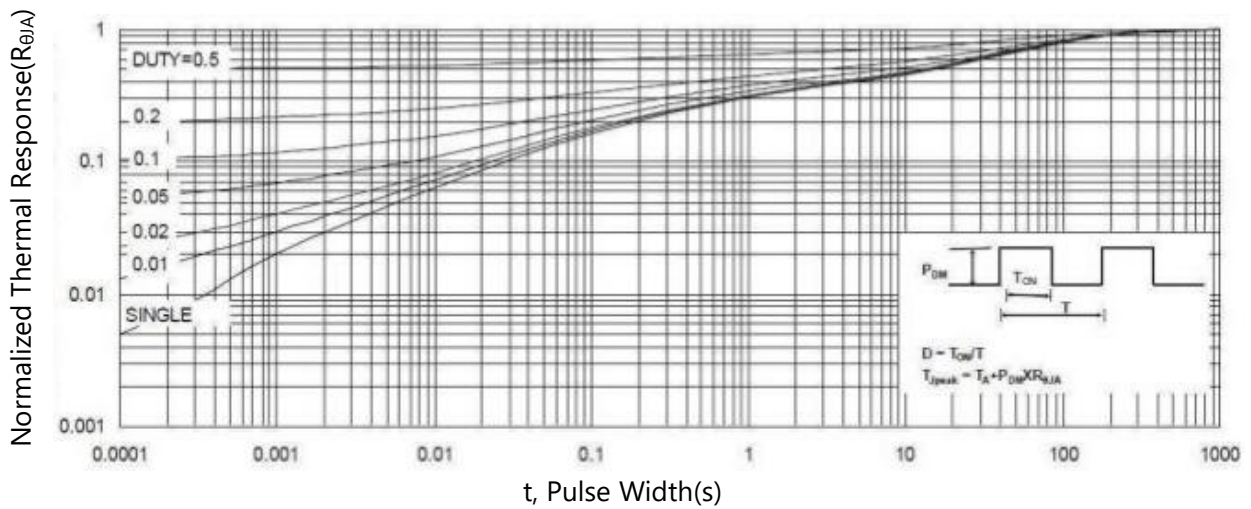


Figure 10. Switching Time Waveform

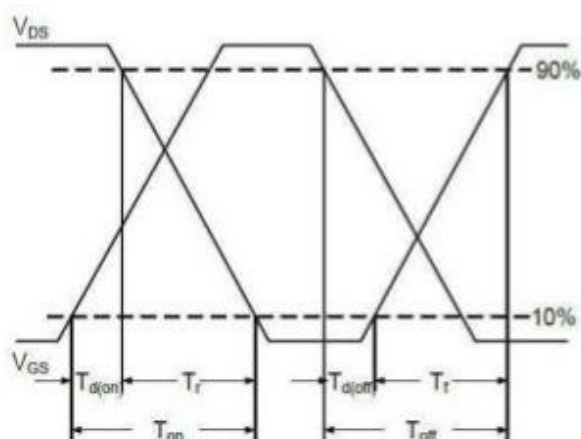
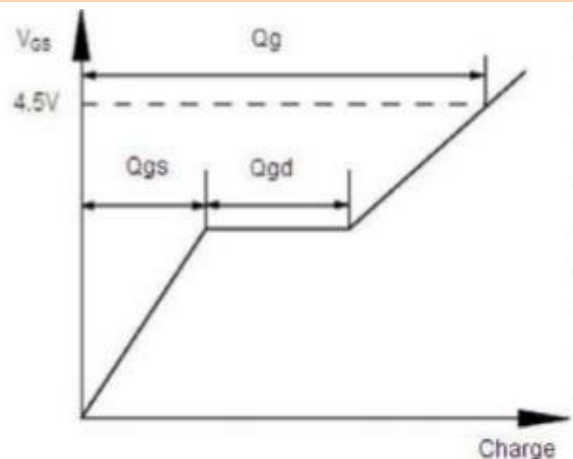
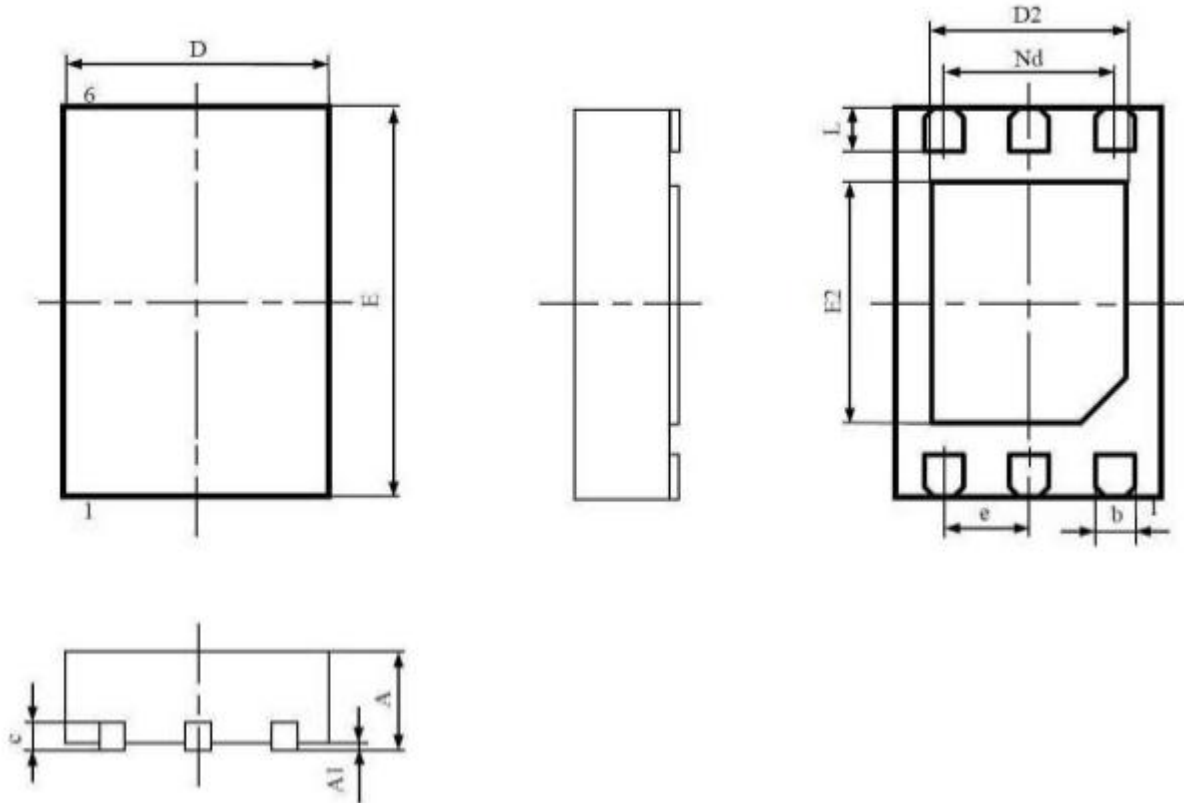


Figure 11. Gate Charge Waveform



PACKAGE INFORMATION

DFN2X3



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.550 | 0.800 | 0.028 | 0.031 |
| A1 | 0.02typ. | 0.050 | 0.001typ. | 0.002 |
| b | 0.200 | 0.350 | 0.008 | 0.014 |
| c | 0.180 | 0.250 | 0.007 | 0.010 |
| D | 1.900 | 2.100 | 0.075 | 0.083 |
| D2 | 1.400 | 1.600 | 0.055 | 0.063 |
| e | 0.5BSC | | 0.02BSC | |
| Nd | 1.0BSC | | 0.04BSC | |
| E | 2.900 | 3.100 | 0.114 | 0.122 |
| E2 | 1.650 | 1.750 | 0.065 | 0.069 |
| L | 0.300 | 0.400 | 0.012 | 0.016 |