

MSF6N40

N-Channel Enhancement Mode Power MOSFET

Description

The MSF6N40 is a N-channel enhancement-mode MOSFET , providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220F package is universally preferred for all commercial-industrial applications

Features

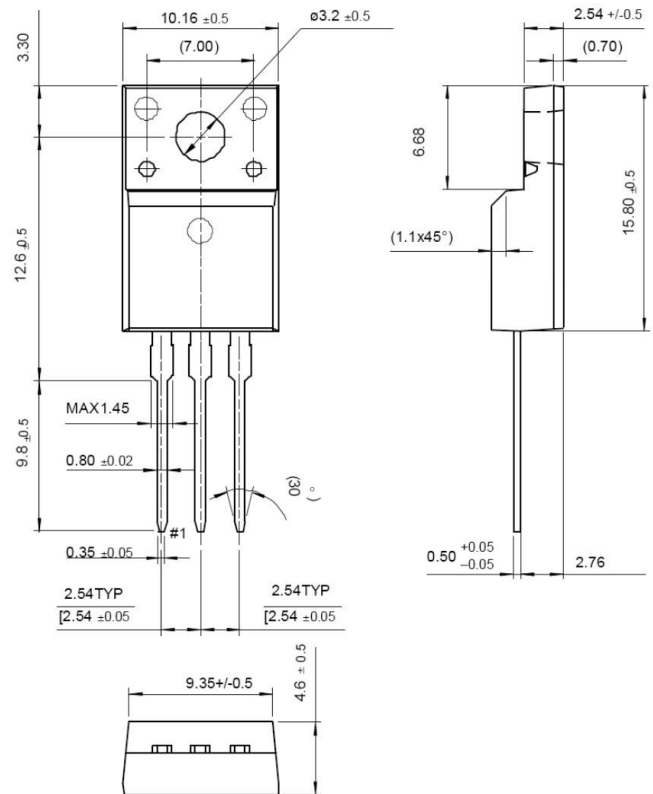
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

Application

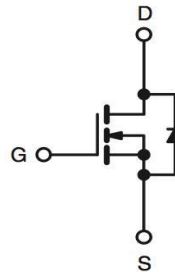
- Adapter
- Switching Mode Power Supply

Packing & Order Information

50/Tube ; 1,000/Box



Graphic symbol



**RoHS
COMPLIANT**

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

| Symbol | Parameter | Value | Unit |
|-----------|--------------------------------------|-------|------|
| V_{DSS} | Drain-Source Voltage | 400 | V |
| V_{GS} | Gate-Source Voltage | ±30 | V |
| I_D | Drain Current -Continuous (TC=25°C) | 5.5 | A |
| | Drain Current -Continuous (TC=100°C) | 3.5 | A |
| I_{DM} | Drain Current Pulsed | 16.4 | A |
| E_{AS} | Single Pulsed Avalanche Energy | 240 | mJ |
| E_{AR} | Repetitive Avalanche Energy | 10 | mJ |
| dv/dt | Peak Diode Recovery dv/dt | 5.5 | V/ns |

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Absolute Maximum Ratings

| Symbol | Parameter | Value | Unit |
|-----------|---|-------------|------|
| T_L | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 300 | °C |
| TPKG | Maximum Temperature for Soldering @ Package Body for 10 seconds | 260 | °C |
| P_D | Total Power Dissipation (TC=25°C) | 38 | W |
| | Derating Factor above 25 °C | 0.3 | W/°C |
| T_{STG} | Operating and Storage Temperature Range | -55 to +150 | °C |
| T_J | Storage Temperature | 150 | °C |

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=5.5A$, $V_{DD}=50V$, $L=8mH$, $V_G=10V$, starting $T_J=+25°C$.
3. $I_{SD} \leq 5.5A$, $dI/dt \leq 100A/\mu s$, $V_{DD} \leq BV_{DSS}$, starting $T_J=+25°C$.

Thermal Characteristics

| Symbol | Parameter | Max. | Units |
|-----------------|---|------|-------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 3.3 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 62.5 | |

Static Characteristics

| Symbol | Test Conditions | Min | Typ. | Max. | Units |
|------------------------------|---|-----|------|------|----------|
| V_{GS} | $V_{DS} = V_{GS}$, $I_D = 250\mu A$ | 2.0 | | 4.0 | V |
| * $R_{DS(ON)}$ | $V_{GS} = 10 V$, $I_D = 2.75 A$ | -- | 0.8 | 1.0 | Ω |
| BV_{DSS} | $V_{GS} = 0 V$, $I_D = 250\mu A$ | 400 | -- | -- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | $I_D = 250\mu A$, Referenced to 25°C | | 0.4 | | |
| I_{DSS} | $V_{DS} = 400 V$, $V_{GS} = 0 V$ | -- | -- | 1 | μA |
| | $V_{DS} = 320 V$, $V_{GS} = 0 V$, $T_J = 125°C$ | | | 10 | |
| I_{GSSF} | $V_{DS} = 30 V$, $V_{GS} = 0 V$ | | | 100 | nA |
| I_{GSSR} | $V_{DS} = -30 V$, $V_{GS} = 0 V$ | -- | -- | -100 | nA |

Dynamic Characteristics

| Symbol | Test Conditions | Min | Typ. | Max. | Units |
|--------------|---|-----|------|------|-------|
| $t_{d(on)}$ | $V_{DS} = 200 V$, $I_D = 5.5 A$, $R_G = 25 \Omega$ | -- | 20 | 50 | ns |
| t_r | | -- | 50 | 110 | ns |
| $t_{d(off)}$ | | -- | 90 | 190 | ns |
| t_f | | -- | 55 | 120 | ns |

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| Dynamic Characteristics | | | | | |
|-------------------------|--|-----|------|------|-------|
| Symbol | Test Conditions | Min | Typ. | Max. | Units |
| C_{ISS} | $V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$ | -- | 670 | 870 | pF |
| C_{OSS} | | -- | 95 | 125 | pF |
| C_{RSS} | | -- | 16 | 21 | pF |
| Q_g | $V_{DS} = 320\text{ V}, I_D = 5.5\text{ A},$ $V_{GS} = 10\text{ V}$ | -- | 25 | 33 | nC |
| Q_{gs} | | -- | 5.0 | -- | |
| Q_{gd} | | -- | 10.0 | -- | |

| Source-Drain Diode Characteristics | | | | | |
|------------------------------------|--|-----|------|------|-------|
| Symbol | Test Conditions | Min | Typ. | Max. | Units |
| I_S | | -- | -- | 5.5 | A |
| I_{SM} | | -- | -- | 22 | |
| V_{SD} | $I_F = 5.5\text{ A}, V_{GS} = 0$ | -- | -- | 1.5 | V |
| t_{rr} | $I_F = 5.5\text{ A}, V_{GS} = 0, di/dt = 100\text{ A}/\mu\text{s}$ | -- | 220 | -- | ns |
| Q_{rr} | | -- | 2 | -- | uC |

Notes;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS} = 5.5\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\text{ W},$ Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 5.5\text{ A}, di/dt \leq 300\text{ A}/\mu\text{s}, V_{DD} \leq BVDSS,$ Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu\text{s},$ Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

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■ Characteristics Curve

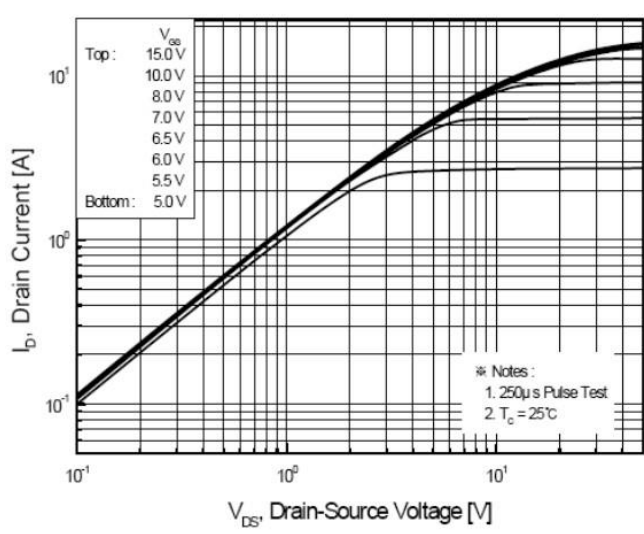


FIG.1-ON REGION CHARACTERISTICS

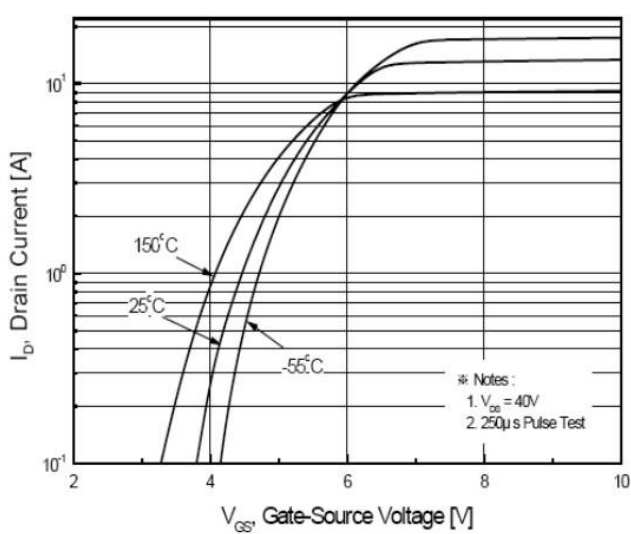


FIG.2-TRANSFER CHARACTERISTICS

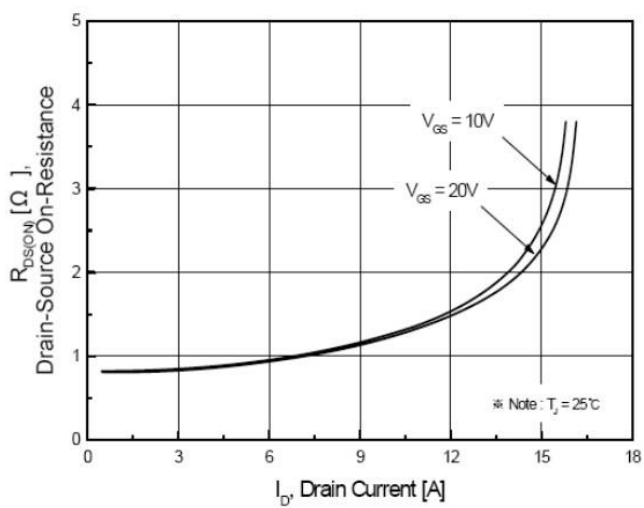


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

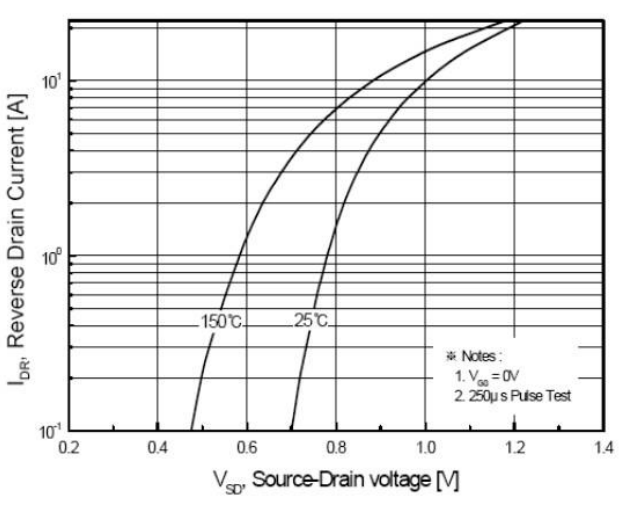


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

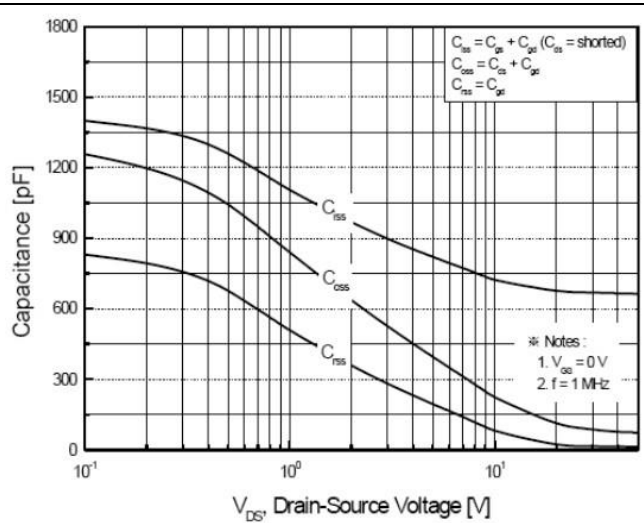


FIG.5-CAPACITANCE CHARACTERISTICS

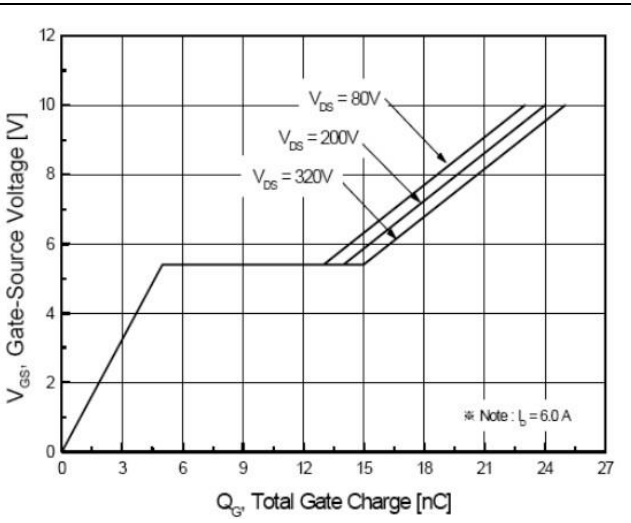


FIG.6-GATE CHARGE CHARACTERISTICS

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■ Characteristics Curve

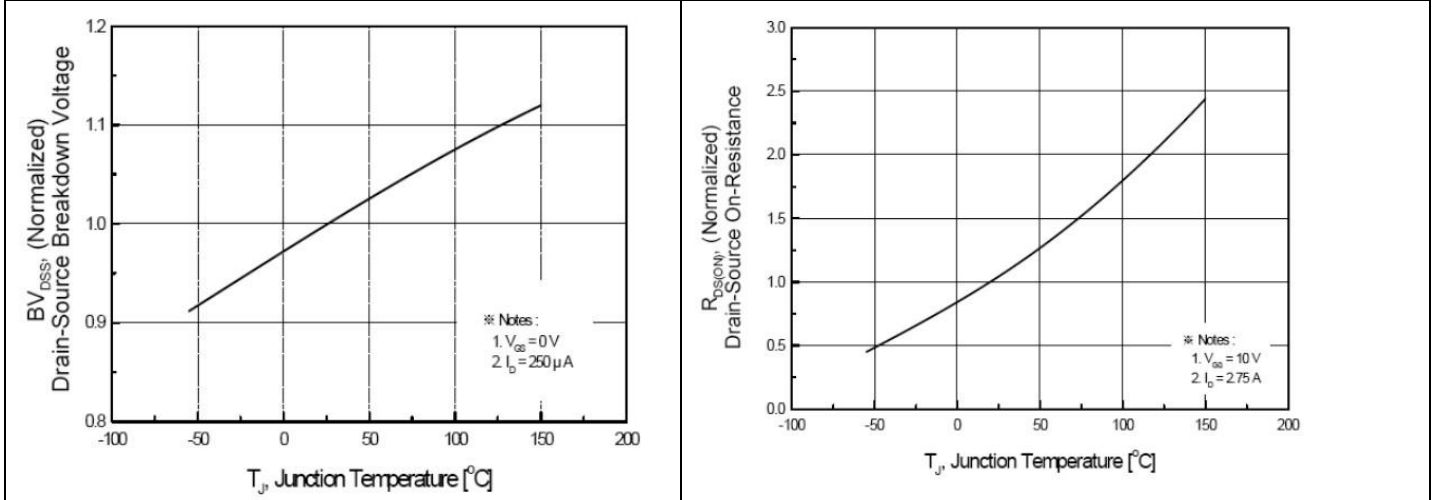


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

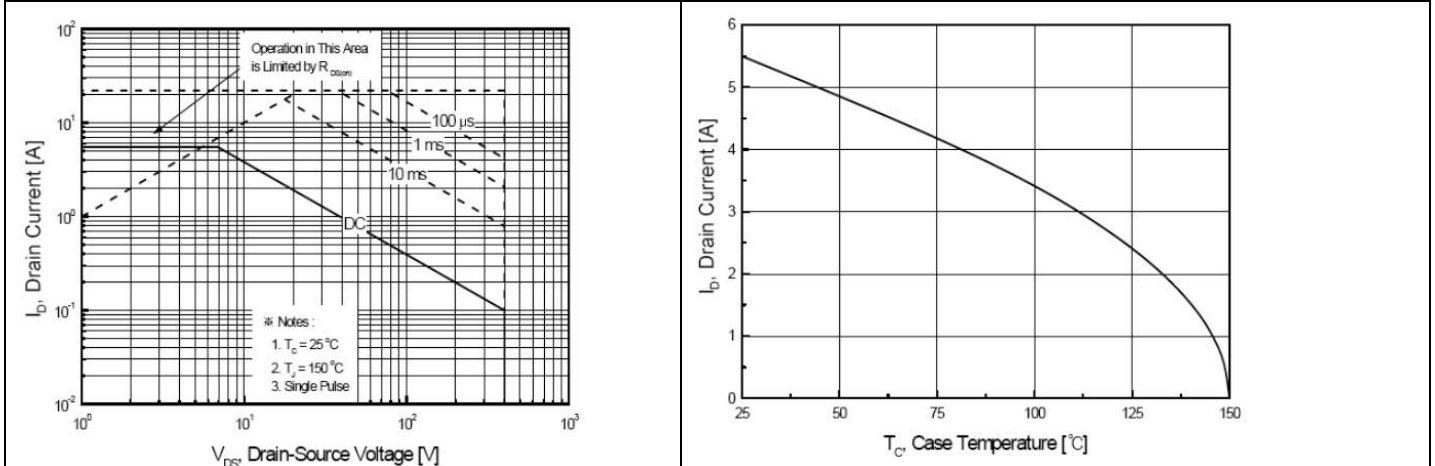


FIG.9-MAXIMUM SAFE OPERATING AREA

FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

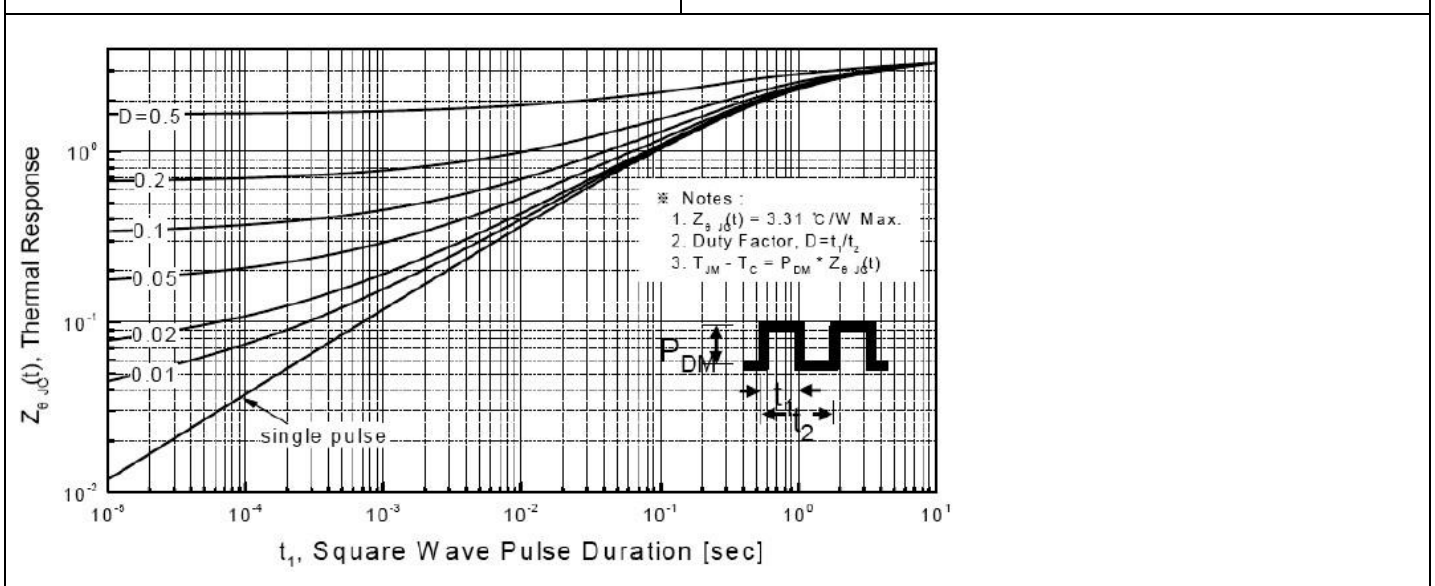


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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