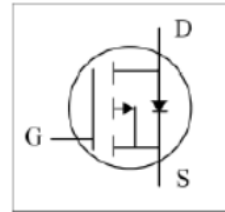


-100V P-Channel Enhancement Mode MOSFET

Description

The IRFR9120NTR uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

It is ESD protected.



General Features

$V_{DS} = -100V, I_D = -8A$

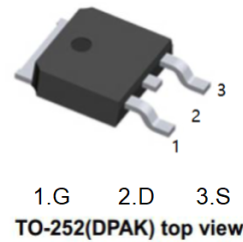
$R_{DS(ON)} < 210m \text{ @ } V_{GS} = -10V$ (Typ:145m)

Super high dense cell design

Advanced trench process technology

Reliable and rugged

High density cell design for ultra low on-resistance



Application

Power switch

DC/DC converters

Absolute Maximum Ratings ($T_c = 25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|--------------------|------------|---------------|
| Drain-Source Voltage | V_{DS} | -100 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | -8 | A |
| Drain Current-Continuous($T_c = 100^\circ C$) | $I_D(100^\circ C)$ | -6 | A |
| Pulsed Drain Current | I_{DM} | -30 | A |
| Maximum Power Dissipation | P_D | 40 | W |
| Derating factor | | 0.32 | W/ $^\circ C$ |
| Single pulse avalanche energy (Note 5) | E_{AS} | 110 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

-100V P-Channel Enhancement Mode MOSFET

Thermal Characteristic

| | | | |
|---|-----------------|------|---------------|
| Thermal Resistance, Junction-to-Case (Note 2) | $R_{\theta jc}$ | 3.13 | $^{\circ}C/W$ |
|---|-----------------|------|---------------|

Electrical Characteristics ($T_c=25^{\circ}C$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------------------|--------------|--|------|-----|----------|-----------|
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -100 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-100V, V_{GS}=0V$ | | | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 10 | μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1 | | -3 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-16A$ | | 210 | 235 | $m\Omega$ |
| Forward Transconductance | g_{FS} | $V_{DS}=-15V, I_D=-5A$ | 12 | - | | S |
| Input Capacitance | C_{iss} | $V_{DS}=-25V, V_{GS}=0V,$ $F=1.0MHz$ | | 760 | | PF |
| Output Capacitance | C_{oss} | | | 260 | | PF |
| Reverse Transfer Capacitance | C_{rss} | | | 170 | | PF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-50V, I_D=-10A$ $V_{GS}=-10V, R_{GEN}=9.1$ | | 14 | | nS |
| Turn-on Rise Time | t_r | | | 18 | | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 50 | | nS |
| Turn-Off Fall Time | t_f | | | 18 | | nS |
| Total Gate Charge | Q_g | $V_{DS}=-50V, I_D=-10A,$ $V_{GS}=-10V$ | | 25 | | nC |
| Gate-Source Charge | Q_{gs} | | | 5 | | nC |
| Gate-Drain Charge | Q_{gd} | | | 7 | | nC |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=-10A$ | | | -1.2 | V |
| Diode Forward Current (Note 2) | I_S | - | | | -13 | A |
| Reverse Recovery Time | t_{rr} | $T_J = 25^{\circ}C, I_F = -10A$ $di/dt = 100A/\mu s$ (Note 3) | | 35 | | nS |
| Reverse Recovery Charge | Q_{rr} | | | 46 | | nC |
| Forward Turn-On Time | t_{on} | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: $T_J=25^{\circ}C, V_{DD}=-50V, V_G=-10V, L=0.5mH, R_g=25$

Typical Electrical and Thermal Characteristics (Curves)

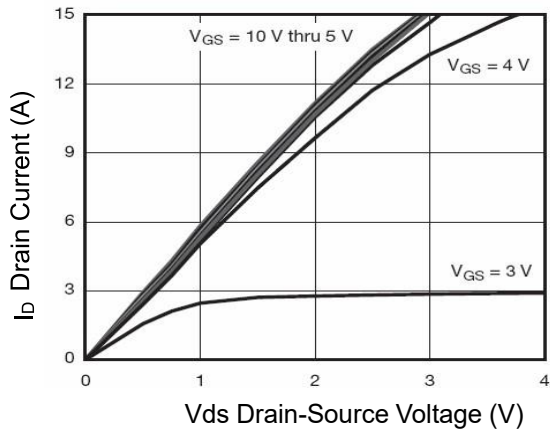


Figure 1 Output Characteristics

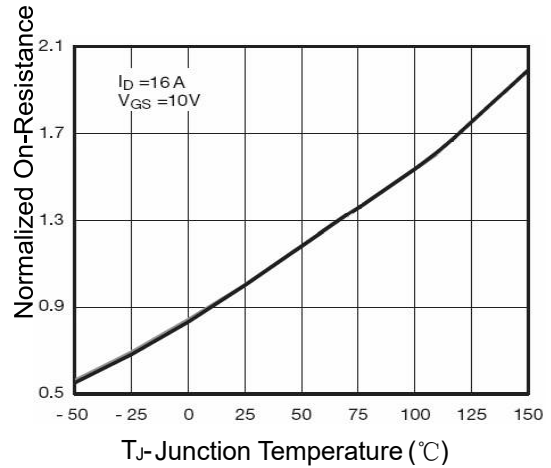


Figure 4 Rdson-Junction Temperature

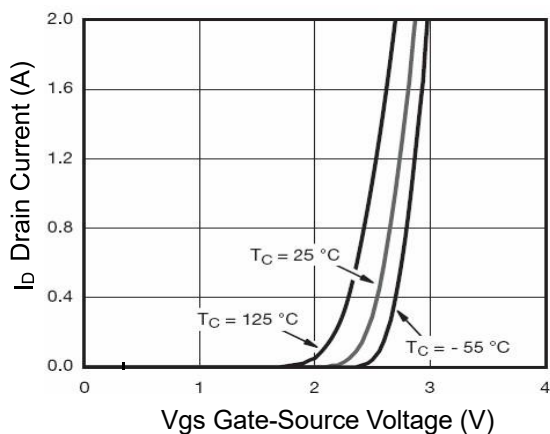


Figure 2 Transfer Characteristics

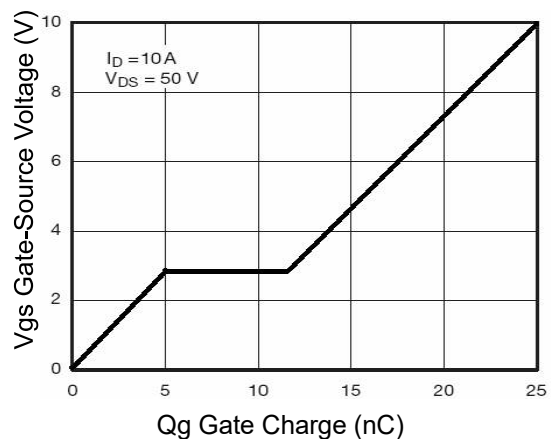


Figure 5 Gate Charge

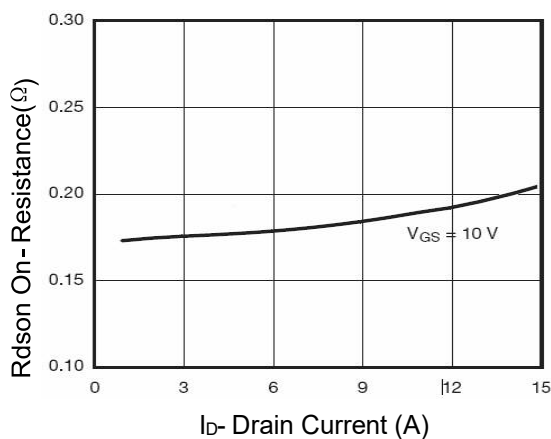


Figure 3 Rdson- Drain Current

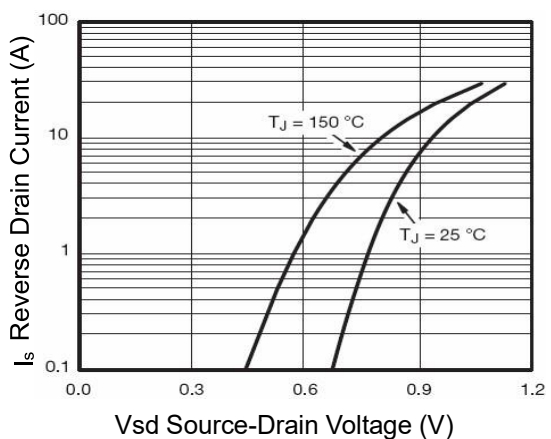


Figure 6 Source- Drain Diode Forward

-100V P-Channel Enhancement Mode MOSFET

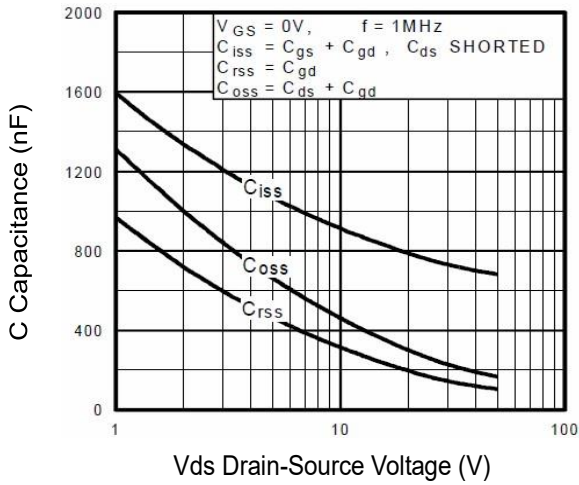


Figure 7 Capacitance vs Vds

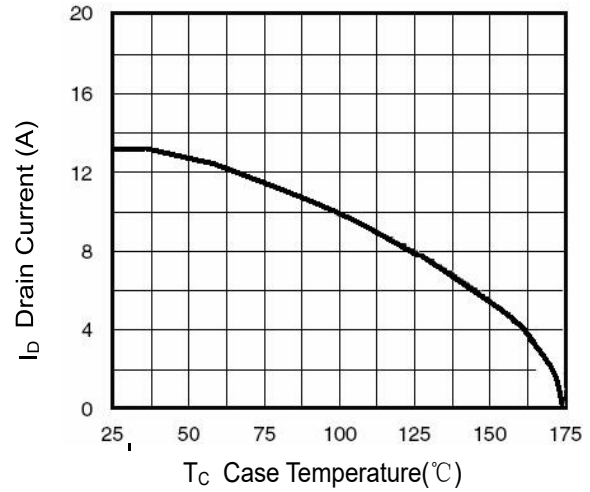


Figure 9 Drain Current vs Case Temperature

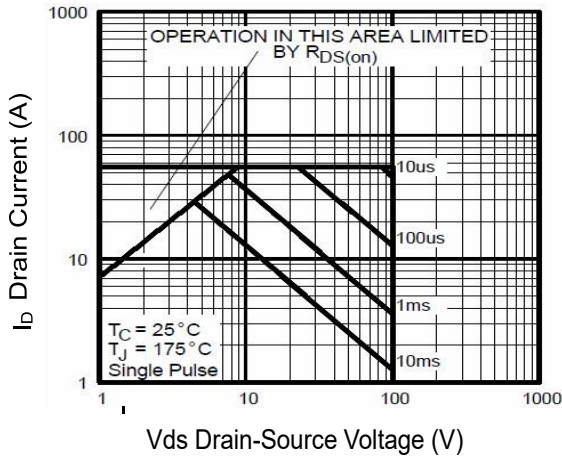


Figure 8 Safe Operation Area

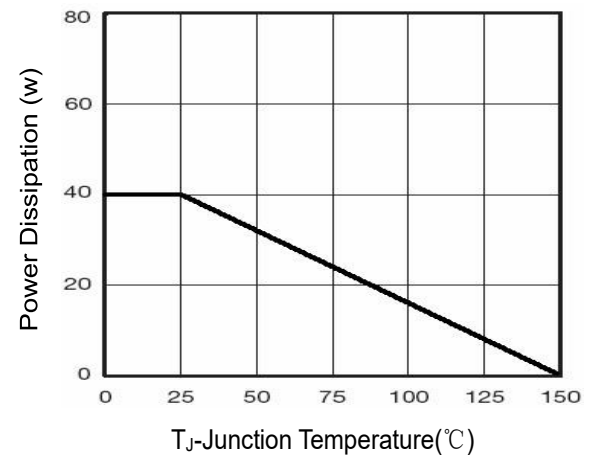


Figure 10 Power De-rating

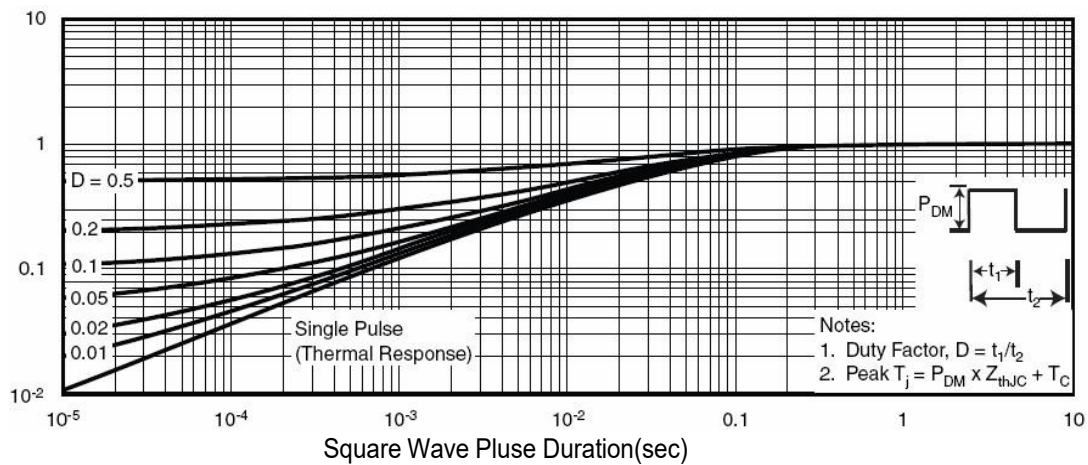
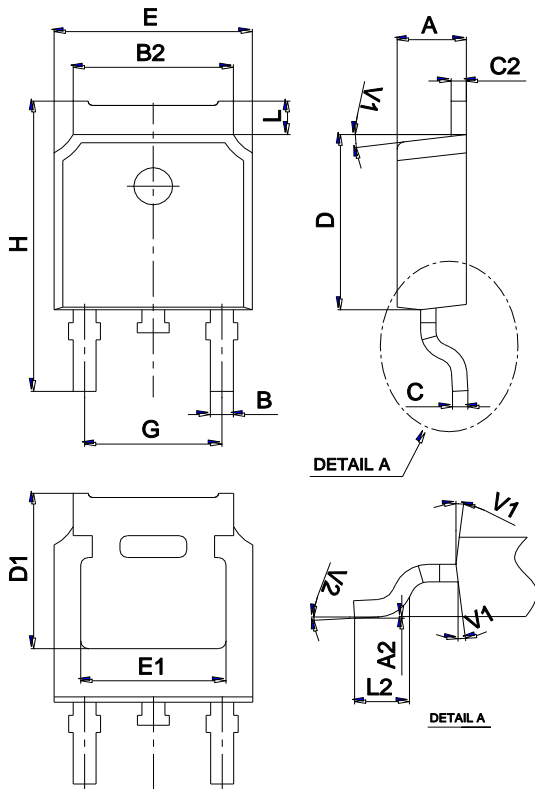


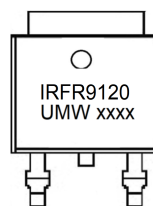
Figure 11 Normalized Maximum Transient Thermal

Package Mechanical Data TO-252



| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|----------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.10 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | 0° | | 6° | 0° | | 6° |

Marking



Ordering information

| Order code | Package | Baseqty | Deliverymode |
|-----------------|---------|---------|---------------|
| UMW IRFR9120NTR | TO-252 | 2500 | Tape and reel |

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