



General Description

The IRLR120NTRPBF use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics.

This device is specially designed to get better ruggedness and suitable to use in.



TO-252-2L

General Features

$V_{DS} = 100V$ $I_D = 12A$

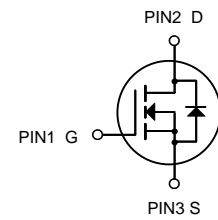
$R_{DS(ON)} < 120m\Omega @ V_{GS}=10V$

Applications

Consumer electronic power supply

Motor control

Synchronous-rectification



N-Channel MOSFET

Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|---------------|-----------|-------------|----------|
| IRLR120NTRPBF | TO-252-2L | 12N10 XXXXX | 2500 |

Absolute Maximum Ratings at $T_j=25^\circ C$ unless otherwise noted

| Symbol | Parameter | Value | Unit |
|----------------------|--|------------|------|
| VDS | Drain source voltage | 100 | V |
| VGS | Gate source voltage | ± 20 | V |
| ID | Continuous drain current ¹⁾ | 12 | A |
| ID, pulse | Pulsed drain current ²⁾ | 24 | A |
| P _D | Power dissipation ³⁾ | 17 | W |
| EAS | Single pulsed avalanche energy ⁴⁾ | 1.2 | mJ |
| Tstg, T _j | Operation and storage temperature | -55 to 150 | °C |
| R θ JC | Thermal resistance, junction-case | 6.6 | °C/W |
| R θ JA | Thermal resistance, junction-ambient ⁵⁾ | 62 | °C/W |



Electrical Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|------|------|-----------|------------|
| Off Characteristic | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu A$ | 100 | 110 | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 100V, V_{GS} = 0V$ | - | - | 1 | μA |
| I_{GSS} | Gate to Body Leakage Current | $V_{DS} = 0V, V_{GS} = \pm 20V$ | - | - | ± 100 | nA |
| On Characteristics ^{note3} | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.0 | 1.8 | 3.0 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance ^{note2} | $V_{GS} = 10V, I_D = 3A$ | - | 95 | 120 | m Ω |
| Dynamic Characteristics ^{note4} | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS} = 50V, V_{GS} = 0V,$ $f = 1.0MHz$ | - | 196 | - | pF |
| C_{oss} | Output Capacitance | | - | 25.9 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 21.4 | - | pF |
| Q_g | Total Gate Charge | $V_{DS} = 50V, I_D = 3A,$ $V_{GS} = 10V$ | - | 4.3 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 3.5 | - | nC |
| Q_{gd} | Gate-Drain("Miller") Charge | | - | 3.1 | - | nC |
| Switching Characteristics ^{note4} | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = 50V, I_{DS}=3A$ $R_G = 2\Omega, V_{GEN} = 10V$ | - | 14.7 | - | ns |
| t_r | Turn-On Rise Time | | - | 3.5 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 20.9 | - | ns |
| t_f | Turn-Off Fall Time | | - | 2.7 | - | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Drain to Source Diode Forward Current ^{note2} | | - | - | 4.5 | A |
| I_{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 12 | A |
| V_{SD} | Drain to Source Diode Forward Voltage ^{note3} | $V_{GS} = 0V, I_S = 3A$ | - | - | 1.3 | V |
| t_{rr} | Body Diode Reverse Recovery Time | $V_{GS} = 0V, I_F = 3A,$ $di/dt = 100A/\mu s$ | - | 32.1 | - | ns |
| Q_{rr} | Body Diode Reverse Recovery Time Charge | | - | 39.4 | - | nC |
| I_{rrm} | Peak Reverse Recovery Current | | - | 2.1 | - | A |

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. $V_{DD}=50$ V, $R_G=50$ Ω , $L=0.3$ mH, starting $T_j=25$ $^{\circ}\text{C}$



Typical Performance Characteristics

Figure 1: Output Characteristics

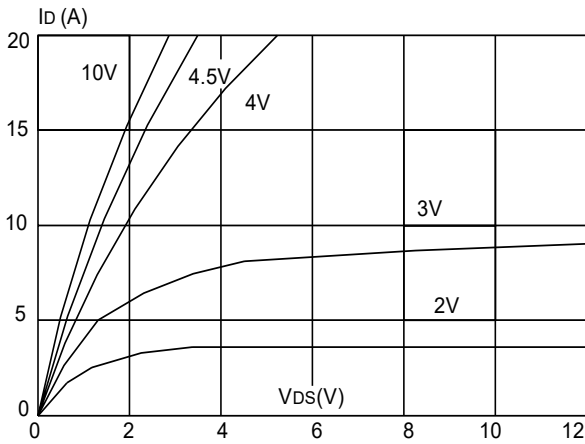


Figure 2: Typical Transfer Characteristics

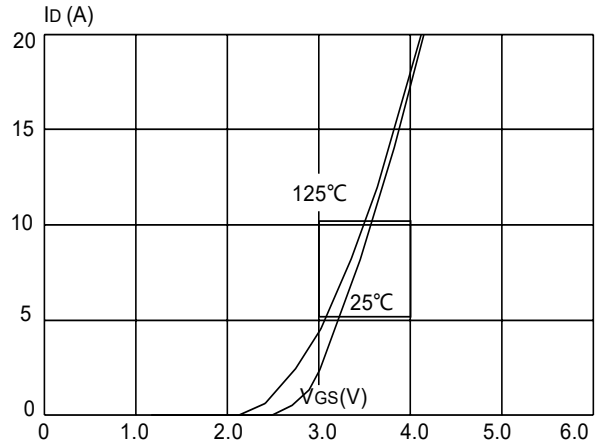


Figure 3: On-resistance vs. Drain Current

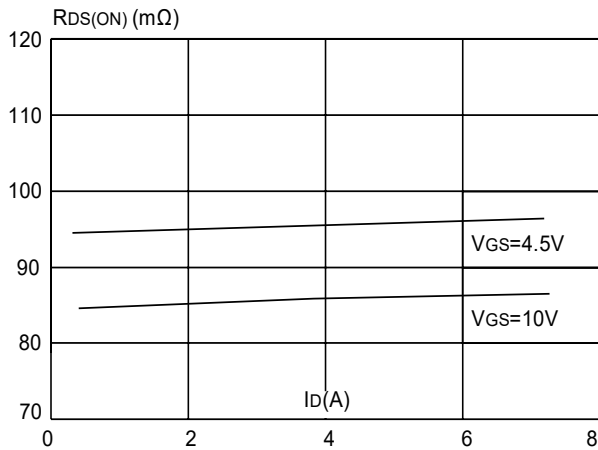


Figure 4: Body Diode Characteristics

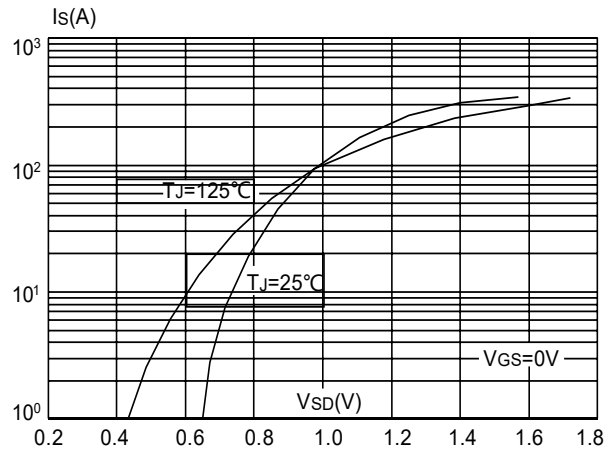


Figure 5: Gate Charge Characteristics

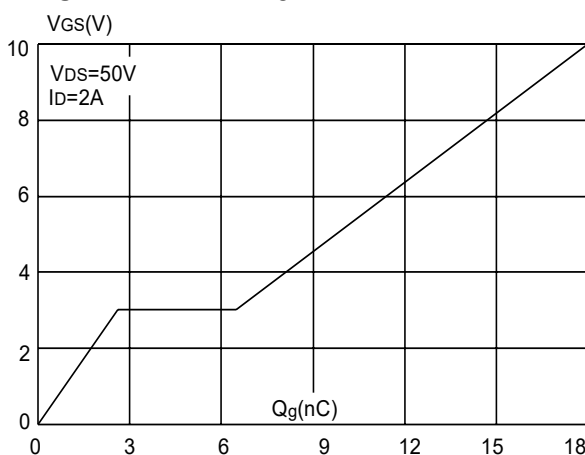


Figure 6: Capacitance Characteristics

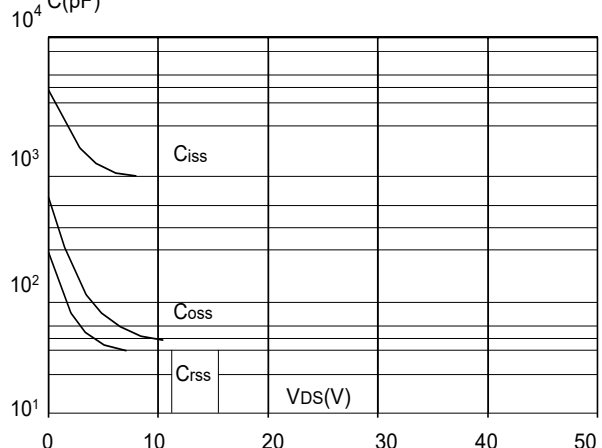




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

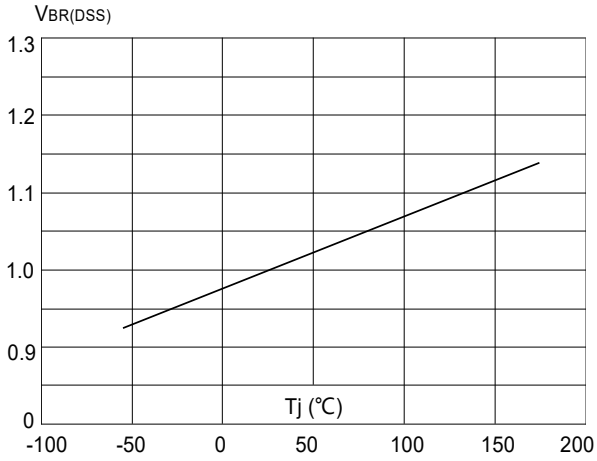


Figure 8: Normalized on Resistance vs. Junction Temperature

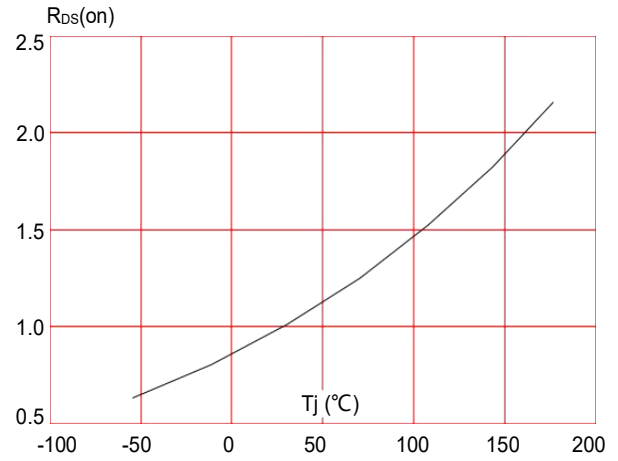


Figure 9: Maximum Safe Operating Area

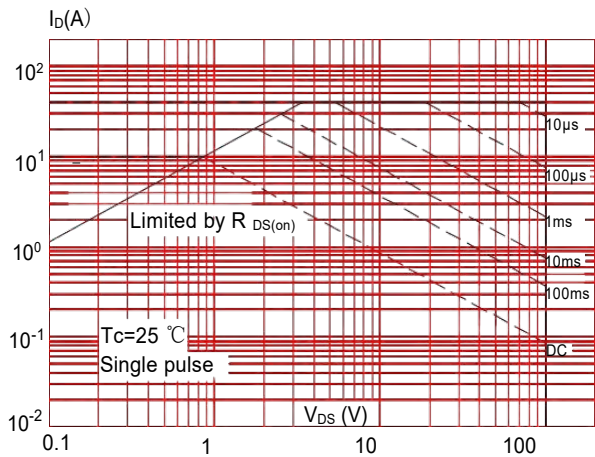


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

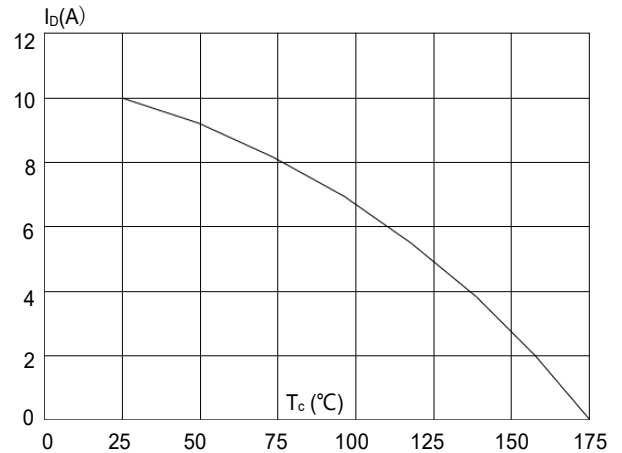
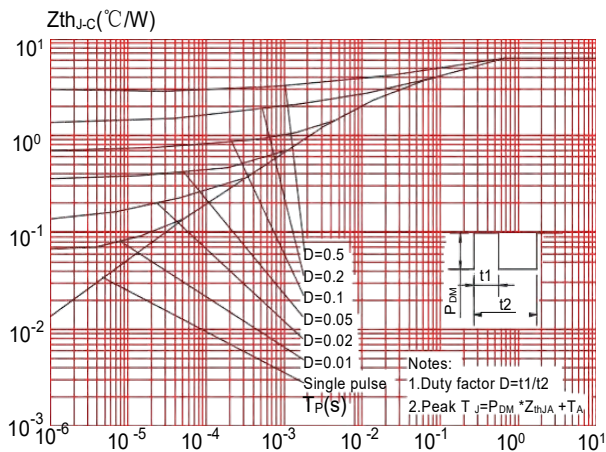
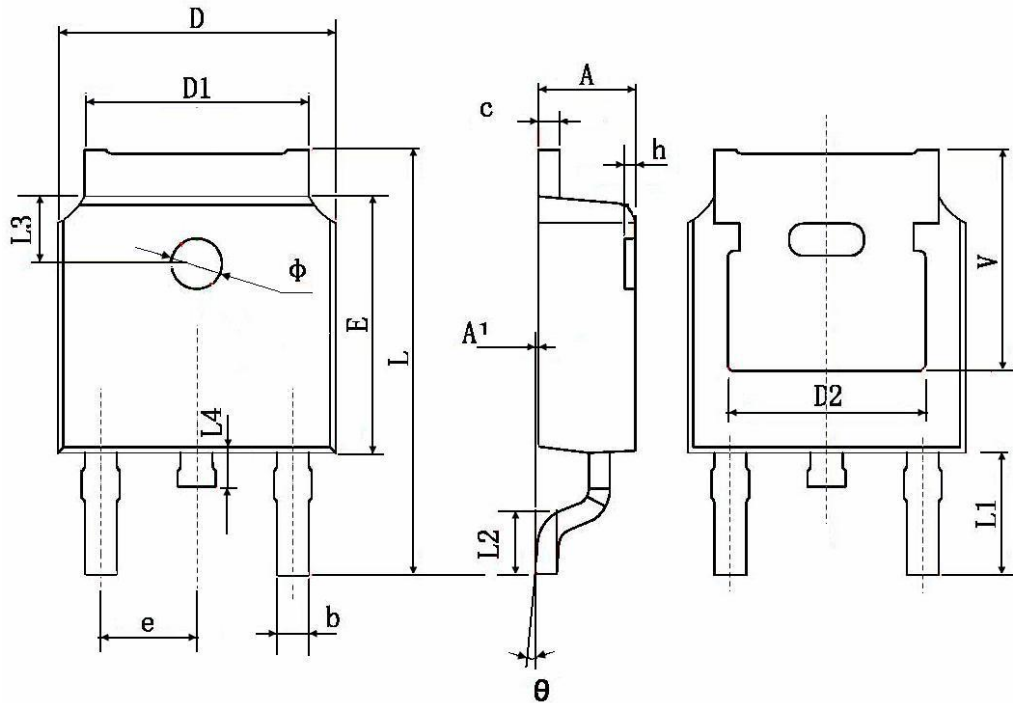


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case





TO-252-2L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 0.483 TYP. | | 0.190 TYP. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.900 TYP. | | 0.114 TYP. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 TYP. | | 0.063 TYP. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350 TYP. | | 0.211 TYP. | |



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