



Description

The IRLML5103PBF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



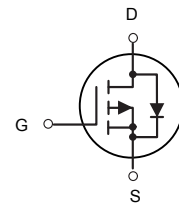
SOT-23

General Features

$V_{DS} = -30V, I_D = -4.1A$
 $R_{DS(ON)} < 56m\Omega @ V_{GS}=10V$

Application

- High power and current handing capability
- Lead free product is acquired
- Surface mount package
- PWM applications
- Load switch
- Power management



P-Channel MOSFET

Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|--------------|--------|------------|----------|
| IRLML5103PBF | SOT-23 | HXY MOSFET | 3000 |

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|-----------------|---|------------|---------------|
| V_{DS} | Drain-Source Voltage | -30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current-Continuous | -4.1 | A |
| I_{DM} | Drain Current-Pulsed ^(Note 1) | -13 | A |
| P_D | Maximum Power Dissipation | 1.32 | W |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 To 150 | $^{\circ}C$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient ^(Note 2) | 125 | $^{\circ}C/W$ |



Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|---|------|-------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.02 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-10V, I _D =-3A | --- | 48 | 56 | mΩ |
| | | V _{GS} =-4.5V, I _D =-1.5A | --- | 78 | 90 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -1.2 | -1.5 | -2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 4.32 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-24V, V _{GS} =0V, T _J =25°C | --- | --- | -1 | uA |
| | | V _{DS} =-24V, V _{GS} =0V, T _J =55°C | --- | --- | -5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =-5V, I _D =-3A | --- | 4.8 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 24 | 48 | Ω |
| Q _g | Total Gate Charge (-4.5V) | V _{DS} =-20V, V _{GS} =-4.5V, I _D =-3A | --- | 5.22 | 7.3 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 1.25 | 1.8 | |
| Q _{gd} | Gate-Drain Charge | | --- | 2.3 | 3.2 | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-15V, V _{GS} =-10V, R _G =3.3Ω I _D =-1A | --- | 18.4 | 37 | ns |
| T _r | Rise Time | | --- | 11.4 | 21 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 39.4 | 79 | |
| T _f | Fall Time | | --- | 5.2 | 10.4 | |
| C _{iss} | Input Capacitance | V _{DS} =-15V, V _{GS} =0V, f=1MHz | --- | 463 | 650 | pF |
| C _{oss} | Output Capacitance | | --- | 82 | 115 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 68 | 95 | |
| I _s | Continuous Source Current ^{1,4} | V _G =V _D =0V, Force Current | --- | --- | -3.2 | A |
| I _{SM} | Pulsed Source Current ^{2,4} | | --- | --- | -13 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1 | V |

Note :

- 1.The data tested by surface mounted on a 1 inch²FR-4 board with 2OZ copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.



Typical Characteristics

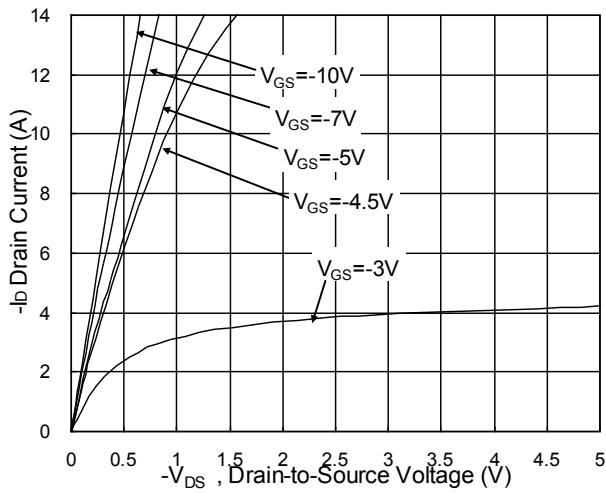


Fig.1 Typical Output Characteristics

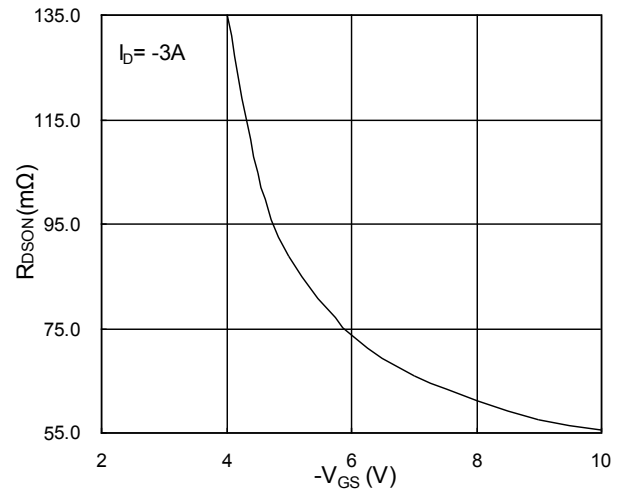


Fig.2 On-Resistance vs. G-S Voltage

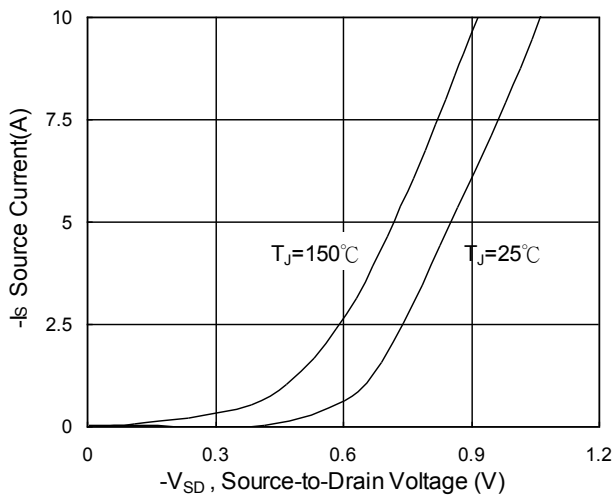


Fig.3 Source Drain Forward Characteristics

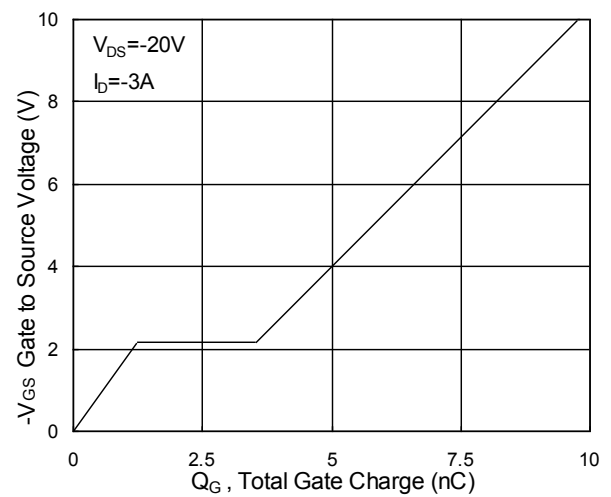


Fig.4 Gate-Charge Characteristics

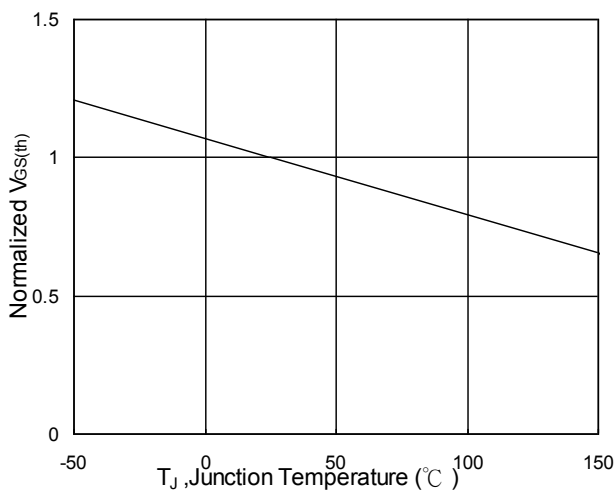


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

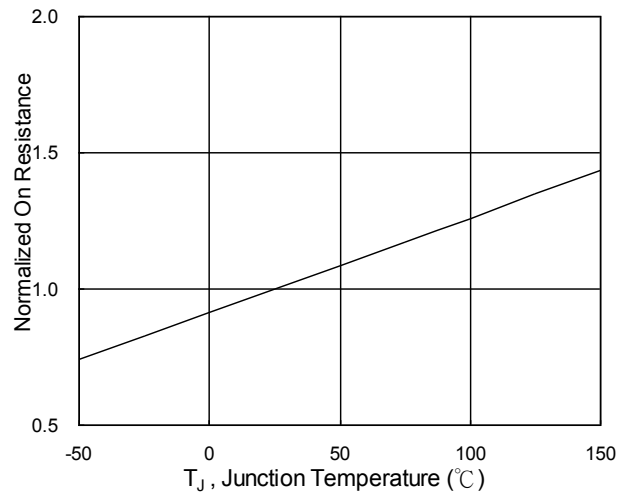


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

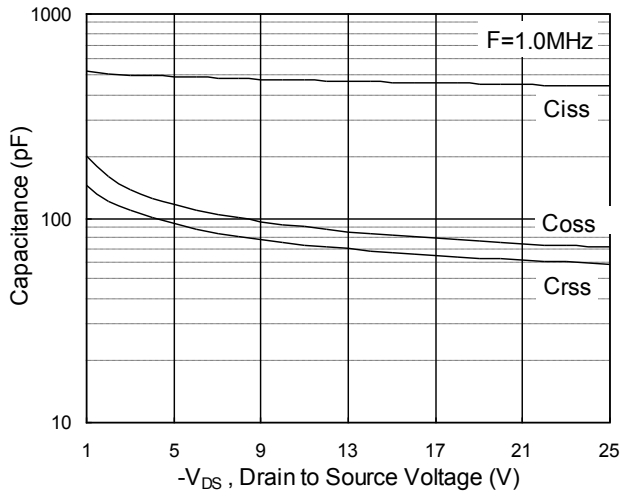


Fig.7 Capacitance

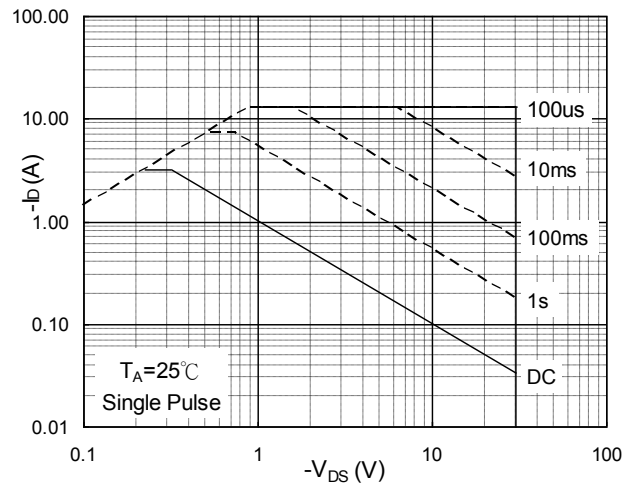


Fig.8 Safe Operating Area

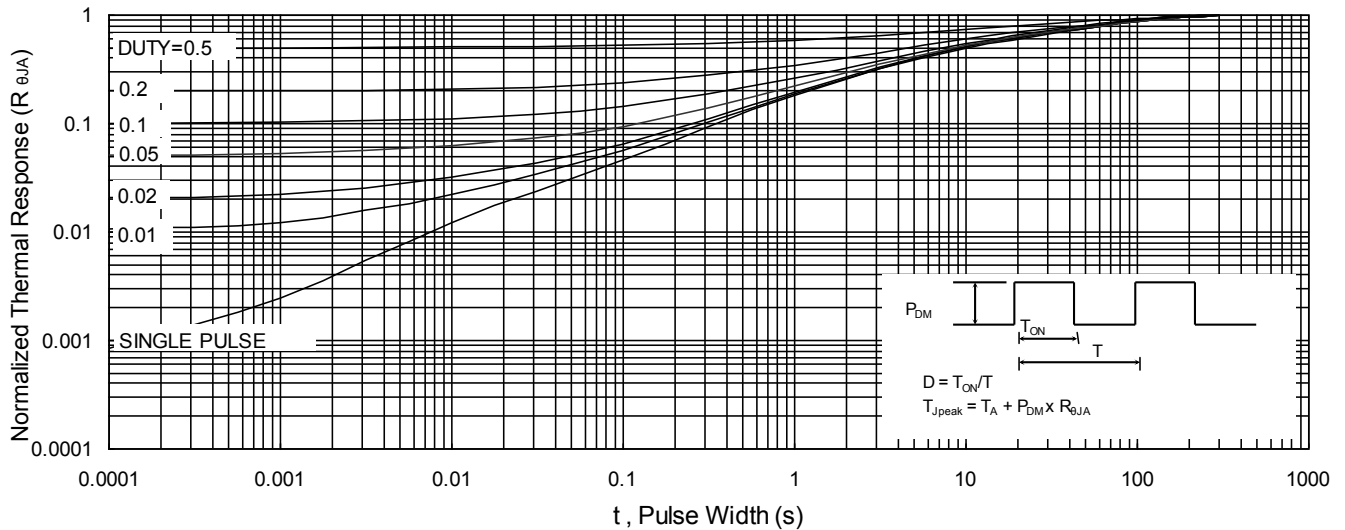


Fig.9 Normalized Maximum Transient Thermal Impedance

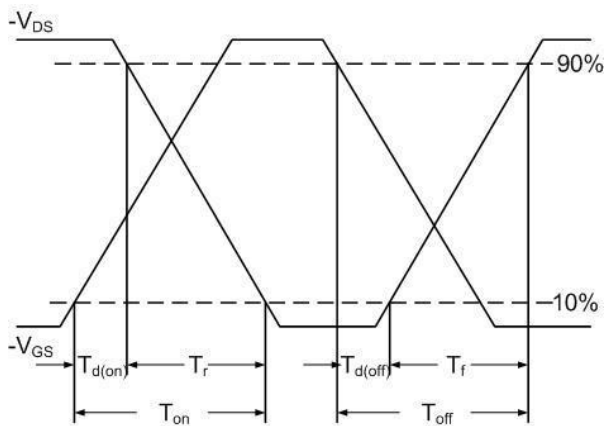


Fig.10 Switching Time Waveform

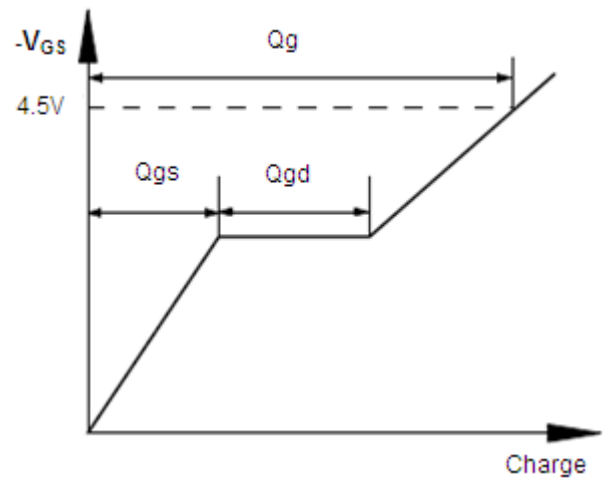
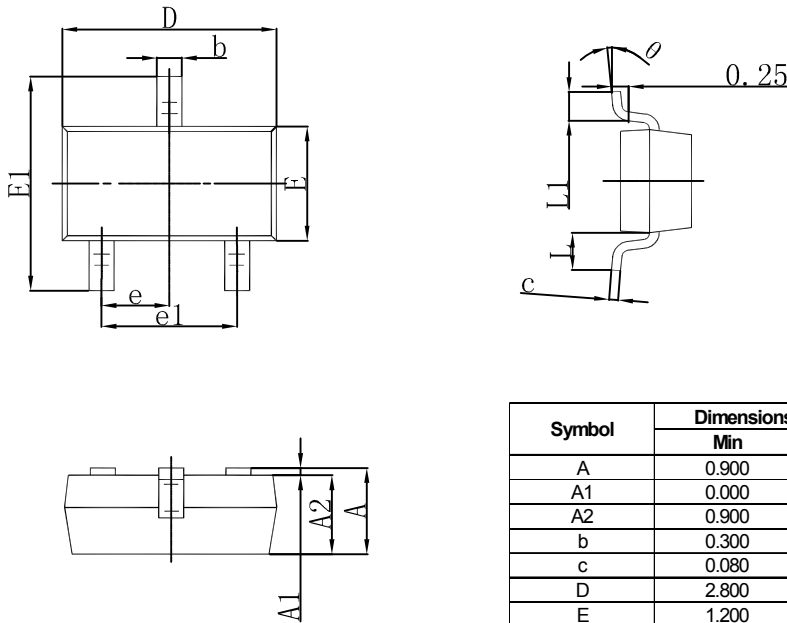


Fig.11 Gate Charge Waveform

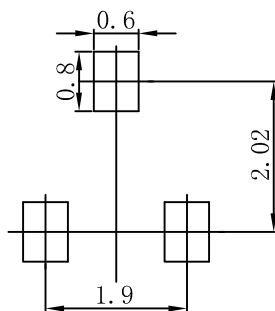


SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF | | 0.022 REF | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |

SOT-23 Suggested Pad Layout



- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.



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