
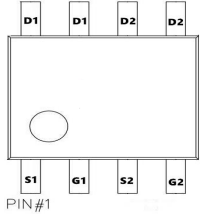
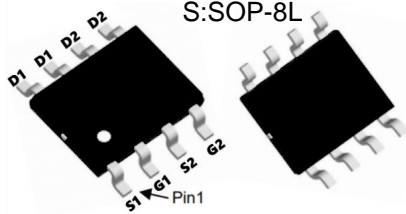
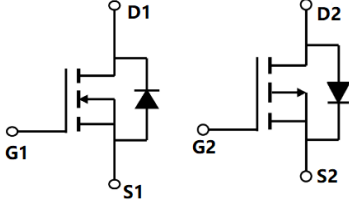


TM030G04S

N+P-Channel Enhancement Mode Mosfet

| | |
|--|---|
| <p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM | <p>Product Summary</p> <p>N Channel</p> <p>$V_{DS} = 40V, I_D = 6.3A$ $R_{DS(ON)} = 30m\Omega$ (typ.) @ $V_{GS} = 10V$</p> <p>P Channel</p> <p>$V_{DS} = -40V, I_D = -6.1A$ $R_{DS(ON)} = 68m\Omega$ (typ.) @ $V_{GS} = -10V$</p> <p>100% UIS Tested 100% R_g Tested</p>  |
|--|---|

Marking: 06G04 OR 4614C

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

| Symbol | Parameter | Rating | | Units |
|--------------------------|--|------------|------------|--------------|
| | | N-Ch | P-Ch | |
| V_{DS} | Drain-Source Voltage | 40 | -40 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | ± 20 | V |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 6.3 | -6.1 | A |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 4.9 | -3.8 | A |
| I_{DM} | Pulsed Drain Current ² | 23 | -22 | A |
| EAS | Single Pulse Avalanche Energy ³ | 16.2 | 39 | mJ |
| I_{AS} | Avalanche Current | 6.8 | -6.8 | A |
| $P_D @ T_A = 25^\circ C$ | Total Power Dissipation ⁴ | 1.67 | 1.67 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | -55 to 150 | $^\circ C$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | 75 | | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | 30 | | $^\circ C/W$ |



TM030G04S

N+P-Channel Enhancement Mode Mosfet

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------|--|--|------|-------|------|-------|
| BVDSS | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 40 | 44 | --- | V |
| ΔBVDSS/ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.032 | --- | V/°C |
| RDS(ON) | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =4A | --- | 30 | 39 | mΩ |
| | | V _{GS} =4.5V, I _D =3A | --- | 40 | 48 | |
| VGS(th) | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.5 | 2.5 | 3.5 | V |
| ΔVGS(th) | VGS(th) Temperature Coefficient | | --- | -4.5 | --- | mV/°C |
| IDSS | Drain-Source Leakage Current | V _{DS} =32V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =32V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| IGSS | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | V _{DS} =5V, I _D =4A | --- | 8 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.4 | 4.8 | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V, V _{GS} =4.5V, I _D =3A | --- | 5 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 1.54 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 1.84 | --- | |
| Td(on) | Turn-On Delay Time | V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω I _D =1A | --- | 7.8 | --- | ns |
| T _r | Rise Time | | --- | 2.1 | --- | |
| Td(off) | Turn-Off Delay Time | | --- | 29 | --- | |
| T _f | Fall Time | | --- | 2.1 | --- | |
| Ciss | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 452 | --- | pF |
| Coss | Output Capacitance | | --- | 51 | --- | |
| Crss | Reverse Transfer Capacitance | | --- | 38 | --- | |
| IS | Continuous Source Current ^{1,4} | V _G =V _D =0V, Force Current | --- | --- | 6.3 | A |
| ISM | Pulsed Source Current ^{2,4} | | --- | --- | 14 | A |
| VSD | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |

Note :

- 1、 The data tested by surface mounted on a 1 inch² FR-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.

TM030G04S

N+P-Channel Enhancement Mode Mosfet

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------|--|--|------|--------|------|-------|
| BVDSS | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -40 | -44 | --- | V |
| ΔBVDSS/ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.018 | --- | V/°C |
| RDS(ON) | Static Drain-Source On-Resistance ² | V _{GS} =-10V, I _D =-3A | --- | 68 | 78 | mΩ |
| | | V _{GS} =-4.5V, I _D =-2A | --- | 78 | 98 | |
| VGS(th) | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -1.5 | -2.5 | -3.5 | V |
| ΔVGS(th) | VGS(th) Temperature Coefficient | | --- | 2.5 | --- | mV/°C |
| IDSS | Drain-Source Leakage Current | V _{DS} =-40V, V _{GS} =0V, T _J =25°C | --- | --- | -1 | uA |
| | | V _{DS} =-40V, V _{GS} =0V, T _J =55°C | --- | --- | -5 | |
| IGSS | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | V _{DS} =-5V, I _D =-3A | --- | 5.8 | --- | S |
| Q _g | Total Gate Charge (-4.5V) | V _{DS} =-32V, V _{GS} =-4.5V, I _D =-3A | --- | 6.4 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 2.1 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 2.5 | --- | |
| Td(on) | Turn-On Delay Time | V _{DD} =-20V, V _{GS} =-4.5V, R _G =3.3Ω, I _D =-3A | --- | 4.2 | --- | ns |
| T _r | Rise Time | | --- | 23 | --- | |
| Td(off) | Turn-Off Delay Time | | --- | 26.8 | --- | |
| T _f | Fall Time | | --- | 20.6 | --- | |
| Ciss | Input Capacitance | V _{DS} =-15V, V _{GS} =0V, f=1MHz | --- | 620 | --- | pF |
| Coss | Output Capacitance | | --- | 65 | --- | |
| Crss | Reverse Transfer Capacitance | | --- | 53 | --- | |
| IS | Continuous Source Current ^{1,4} | V _G =V _D =0V, Force Current | --- | --- | -3.2 | A |
| ISM | Pulsed Source Current ^{2,4} | | --- | --- | -6.1 | A |
| VSD | 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 inch² FR-4 board with 20Z 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.

TM030G04S

N+P-Channel Enhancement Mode Mosfet

N-Typical Characteristics

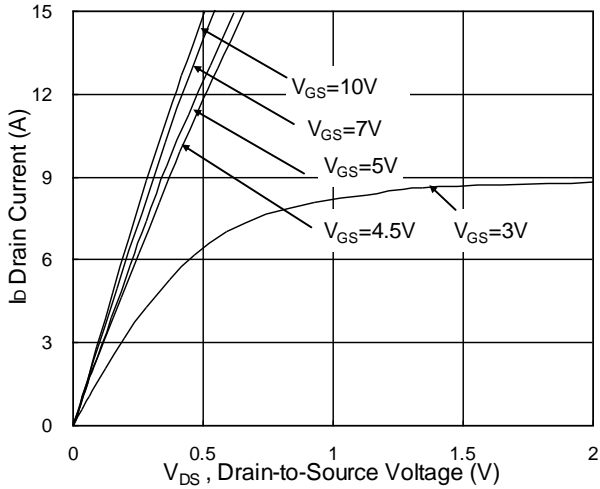


Fig.1 Typical Output Characteristics

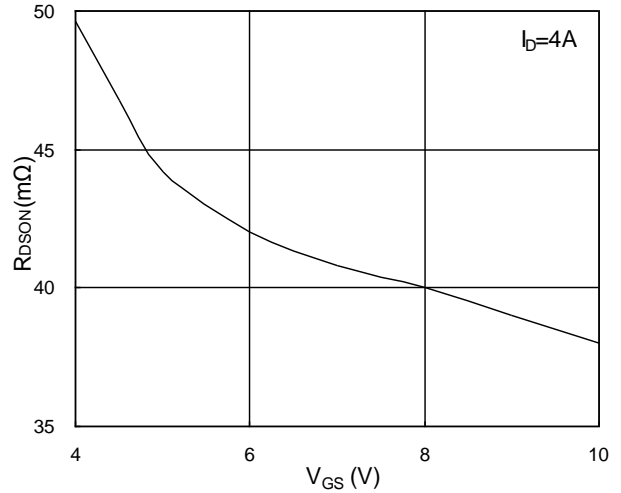


Fig.2 On-Resistance vs. Gate-Source

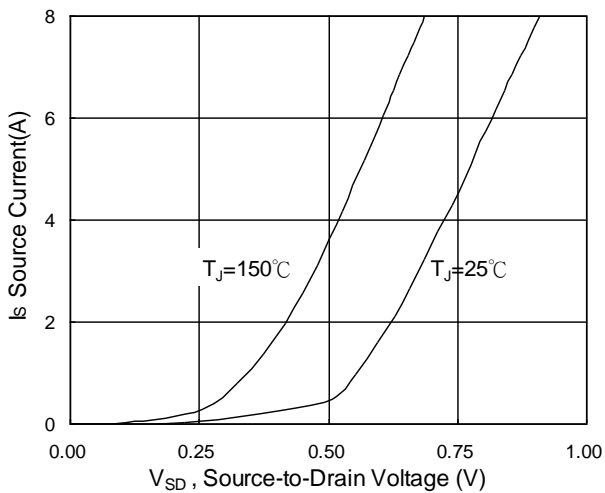


Fig.3 Forward Characteristics Of Reverse

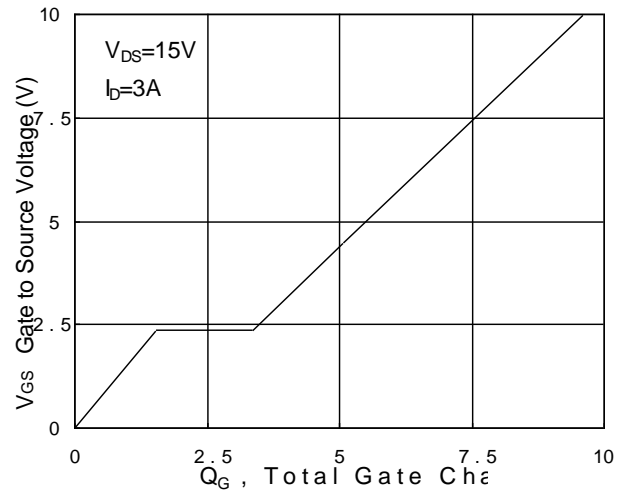


Fig.4 Gate-Charge Characteristics

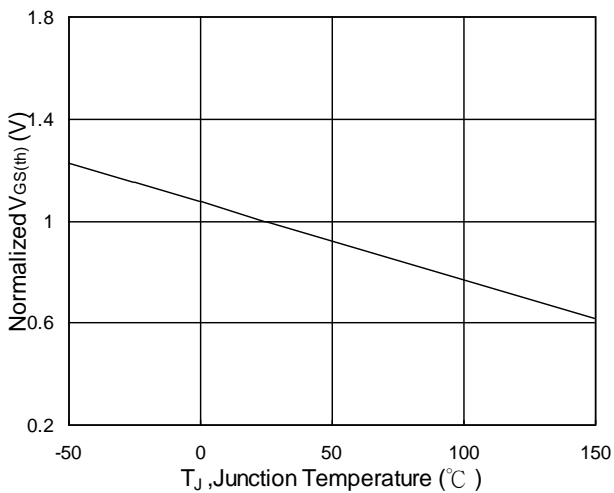


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

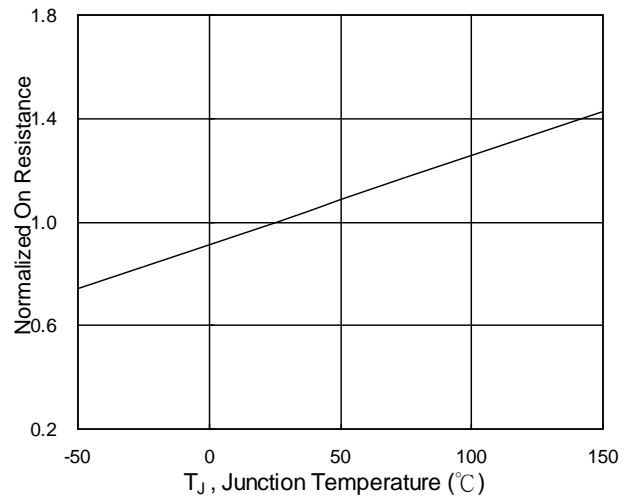


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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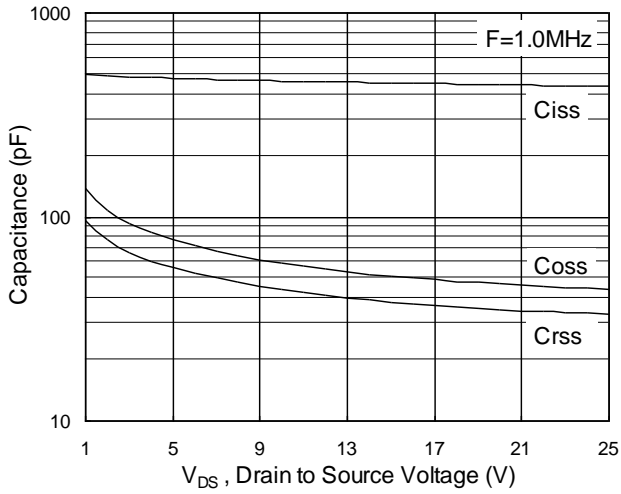


Fig.7 Capacitance

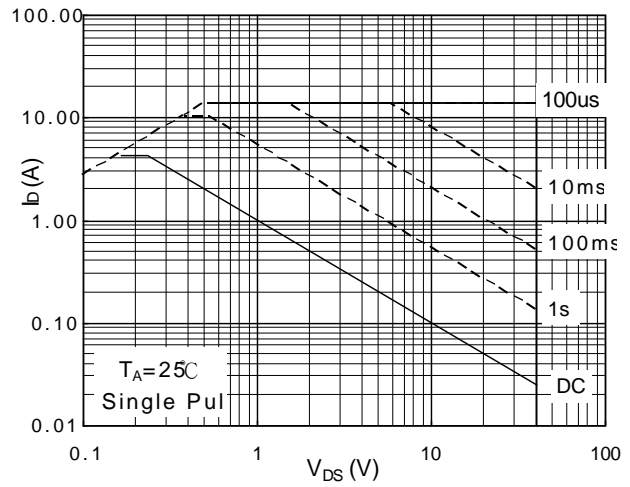


Fig.8 Safe Operating Area

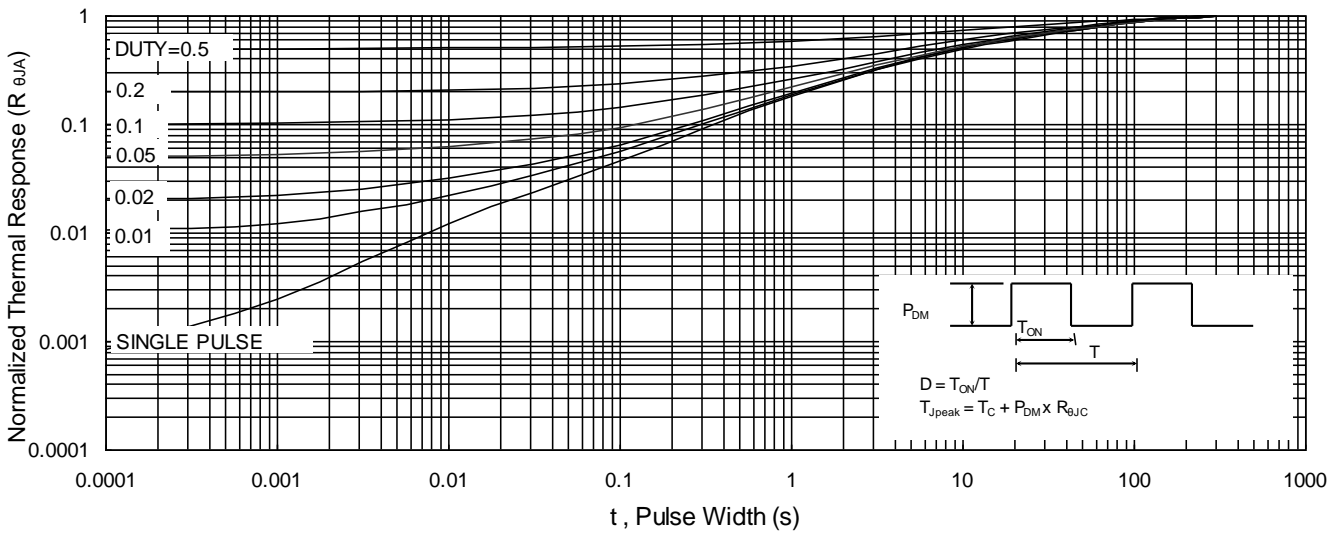


Fig.9 Normalized Maximum Transient Thermal Impedance

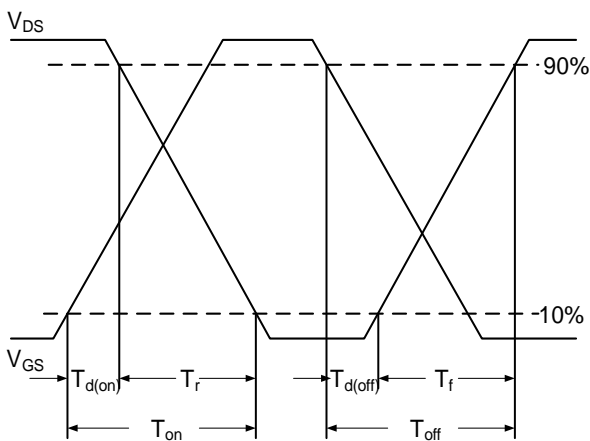


Fig.10 Switching Time Waveform

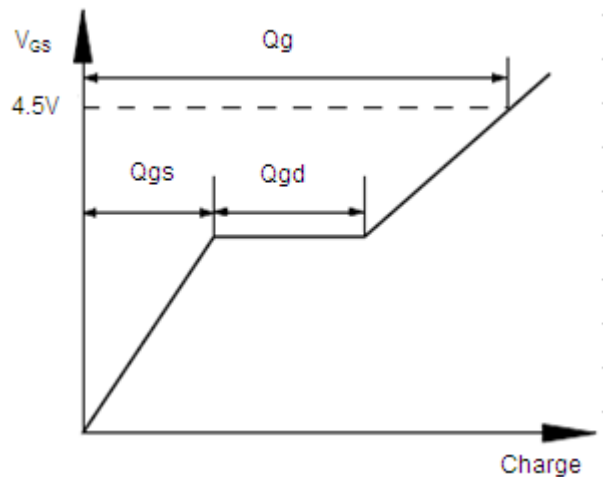


Fig.11 Gate Charge Waveform

TM030G04S

N+P-Channel Enhancement Mode Mosfet

P-Typical Characteristics

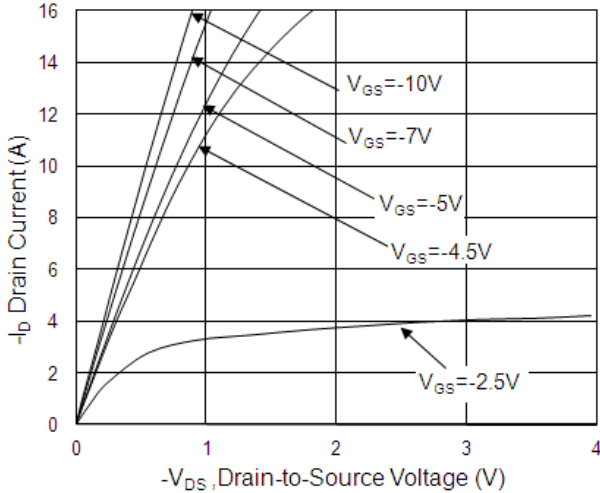


Fig.1 Typical Output Characteristics

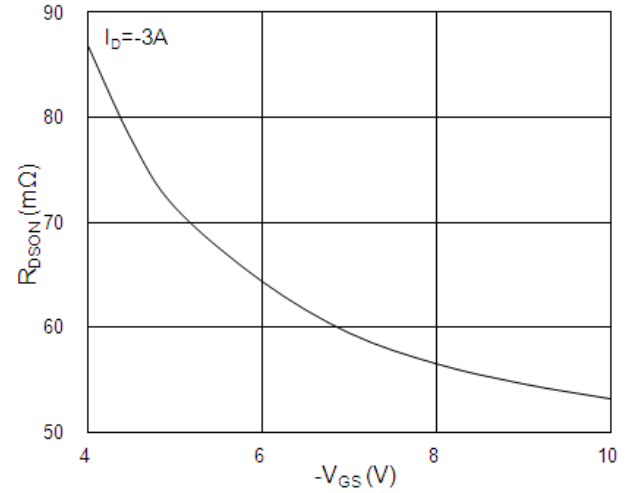


Fig.2 On-Resistance vs. G-S Voltage

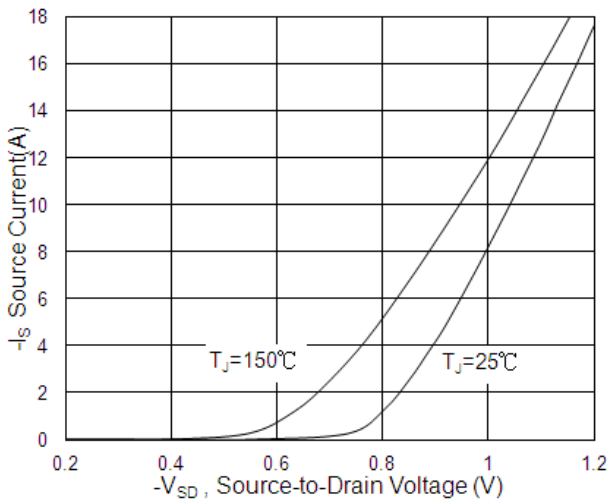


Fig.3 Forward Characteristics Of Reverse

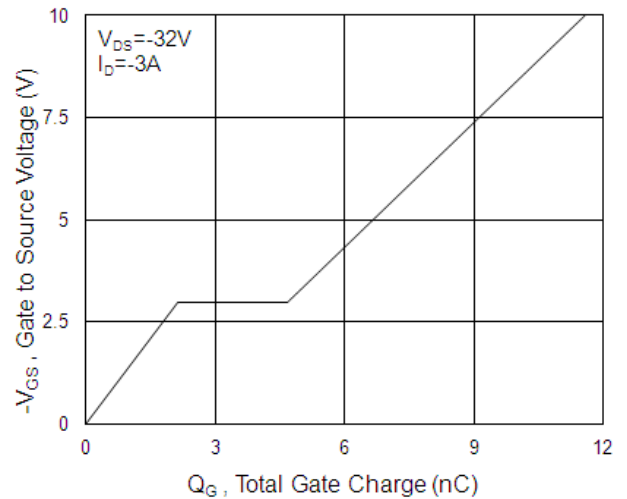


Fig.4 Gate-Charge Characteristics

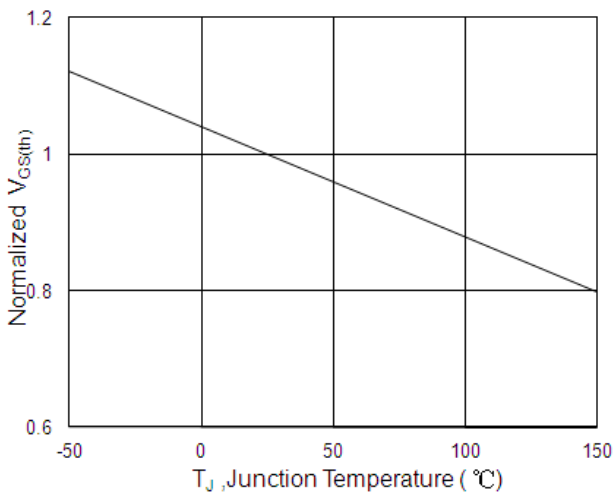


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

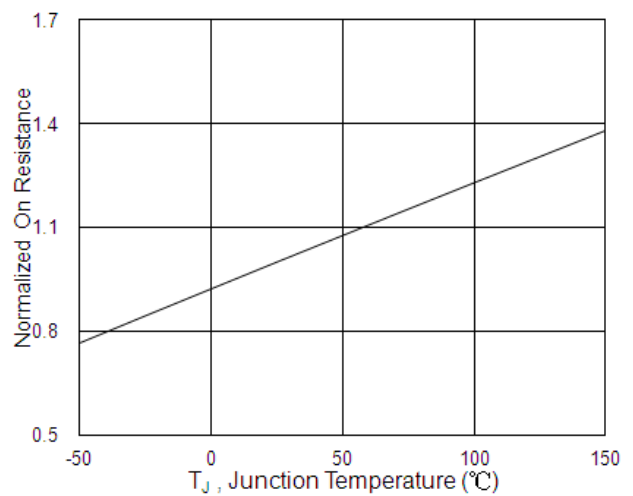


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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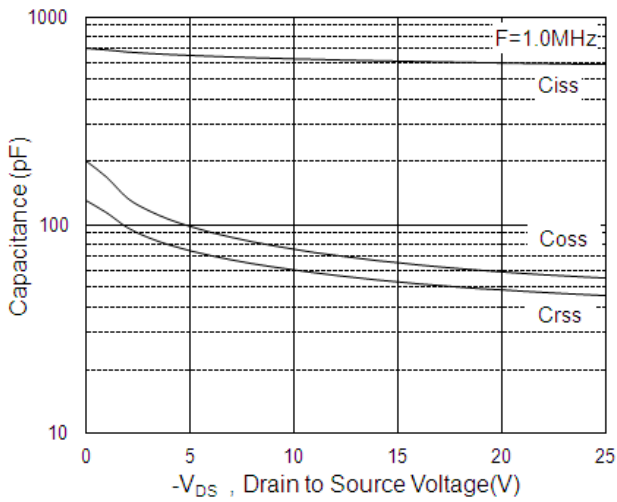


Fig.7 Capacitance

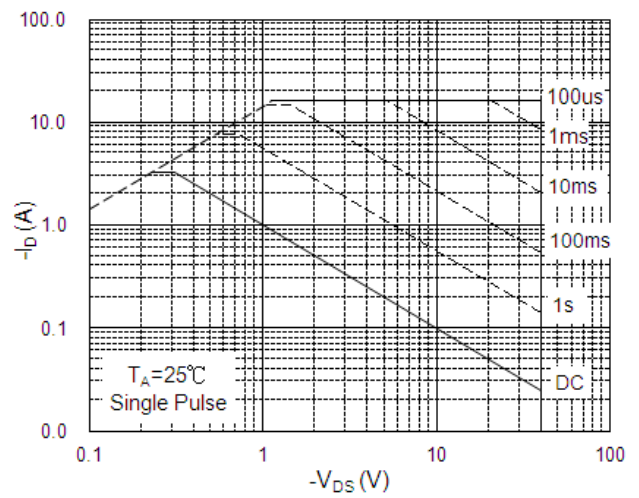


Fig.8 Safe Operating Area

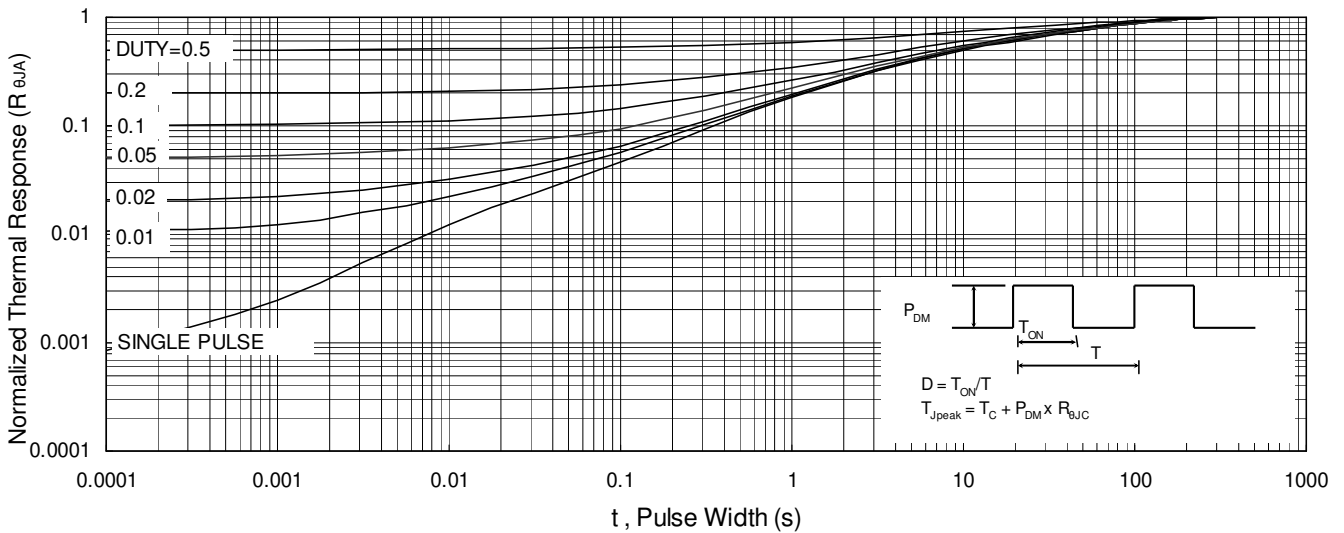


Fig.9 Normalized Maximum Transient Thermal Impedance

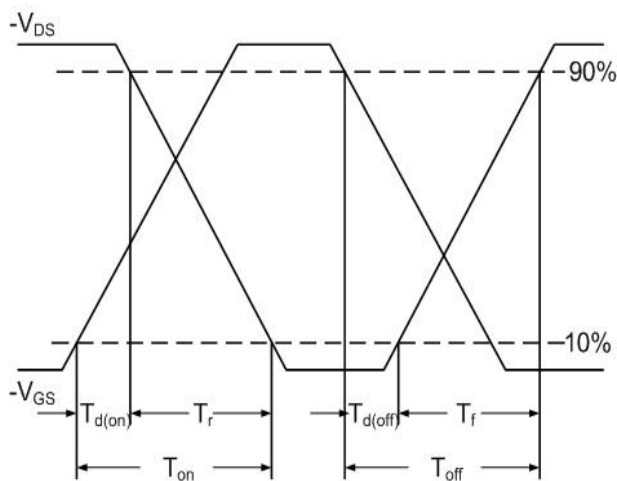


Fig.10 Switching Time Waveform

Data and specifications subject to change without notice.

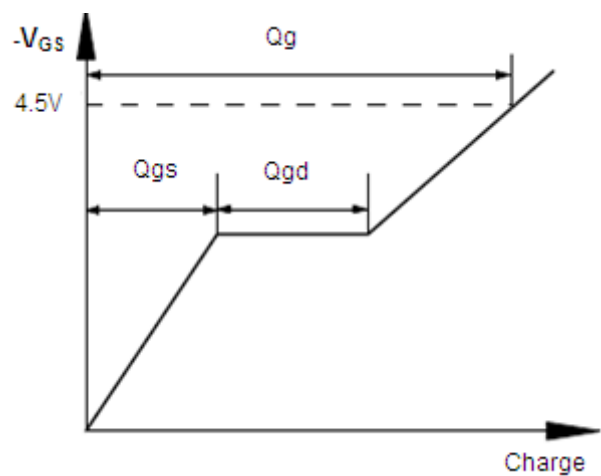
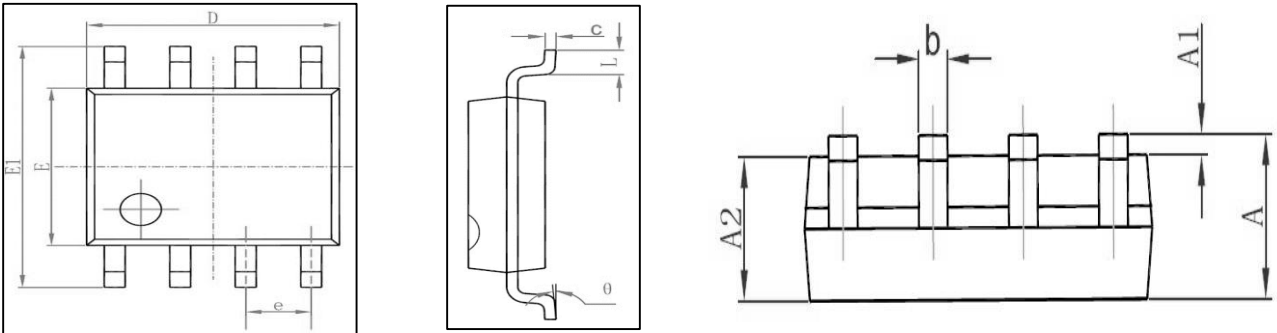
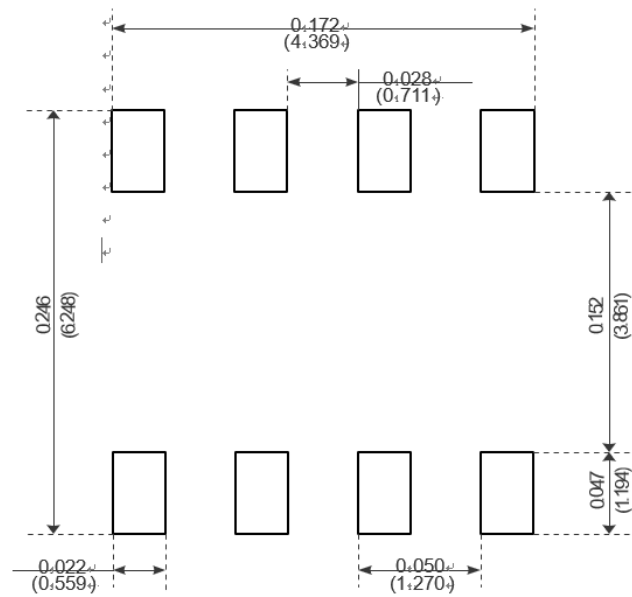


Fig.11 Gate Charge Waveform

Package Mechanical Data:SOP-8L



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |



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