



Description

The DMC4029SK4 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 40V$ $I_D = 20A$

$R_{DS(ON)} < 24m\Omega$ @ $V_{GS}=10V$

$V_{DS} = -40V$ $I_D = -20A$

$R_{DS(ON)} < 38m\Omega$ @ $V_{GS}=-10V$

Application

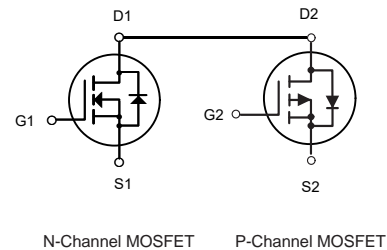
Wireless charging

Boost driver

Brushless motor



TO-252-4L



Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|------------|-----------|------------|----------|
| DMC4029SK4 | TO-252-4L | HXY MOSFET | 2500 |

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

| Symbol | Parameter | Rating | | Units |
|----------------------|--|------------|------------|--------------|
| | | N-Channel | P-Channel | |
| VDS | Drain-Source Voltage | 40 | -40 | V |
| VGS | Gate-Source Voltage | ± 20 | ± 20 | V |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 20 | -20 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 16.5 | -16.5 | A |
| IDM | Pulsed Drain Current ² | 40 | -40 | A |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation ⁴ | 40 | 40 | W |
| TSTG | Storage Temperature Range | -55 to 150 | -55 to 150 | $^\circ C$ |
| TJ | Operating Junction Temperature Range | -55 to 150 | -55 to 150 | $^\circ C$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | 62 | | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | 3.1 | | $^\circ C/W$ |



N-CH Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|-----|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 40 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=40V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | 1.5 | 2.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=10A$ | - | 18 | 24 | m Ω |
| | | $V_{GS}=4.5V, I_D=5A$ | - | 26 | 37 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=10A$ | | 15 | - | S |
| Dynamic Characteristics (Note 4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=20V, V_{GS}=0V,$ $F=1.0MHz$ | - | 1500 | - | PF |
| Output Capacitance | C_{oss} | | - | 215 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 135 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=20V, R_L=2\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$ | - | 4 | - | nS |
| Turn-on Rise Time | t_r | | - | 11.5 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 18 | - | nS |
| Turn-Off Fall Time | t_f | | - | 5.6 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=20V, I_D=10A,$ $V_{GS}=10V$ | - | 24 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 4 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 3.5 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=10A$ | - | 0.8 | 1.2 | V |



P-CH Electrical Characteristics (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|--|------|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =-250μA | -40 | - | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =-40V, V _{GS} =0V | - | - | -1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =-250μA | -1.0 | -1.5 | -2.0 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =-10V, I _D =-7A | - | 33 | 38 | mΩ |
| | | V _{GS} =-4.5V, I _D =-4A | - | 37 | 49 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =-5V, I _D =-7A | - | 15 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =-20V, V _{GS} =0V, F=1.0MHz | - | 1225 | - | PF |
| Output Capacitance | C _{oss} | | - | 190 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 120 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =-20V, R _L =2.3Ω V _{GS} =-10V, R _{GEN} =6Ω | - | 10 | - | nS |
| Turn-on Rise Time | t _r | | - | 15 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 30 | - | nS |
| Turn-Off Fall Time | t _f | | - | 18 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =-20V, I _D =-7A V _{GS} =-10V | - | 21 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 3.5 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 3.0 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V, I _S =-14A | - | - | -1.2 | V |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production



N- Channel Typical Electrical and Thermal Characteristics (Curves)

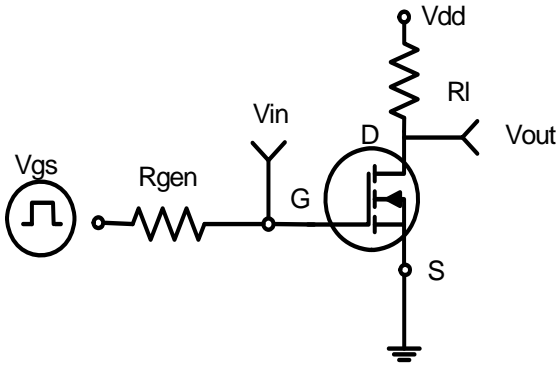


Figure 1: Switching Test Circuit

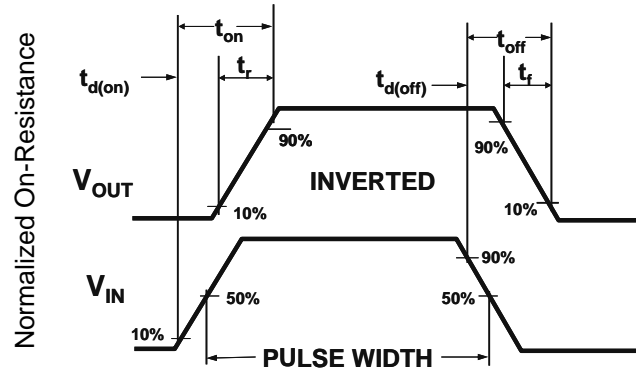


Figure 2: Switching Waveforms

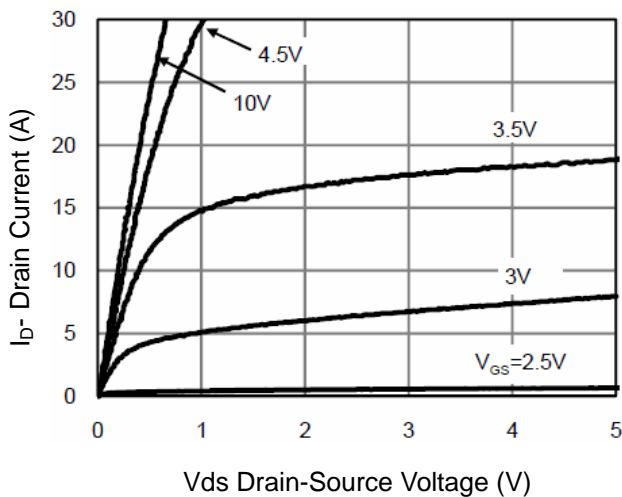


Figure 3 Output Characteristics

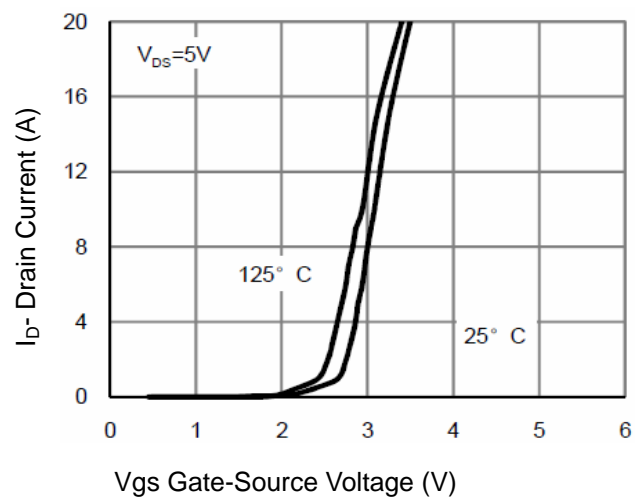


Figure 4 Transfer Characteristics

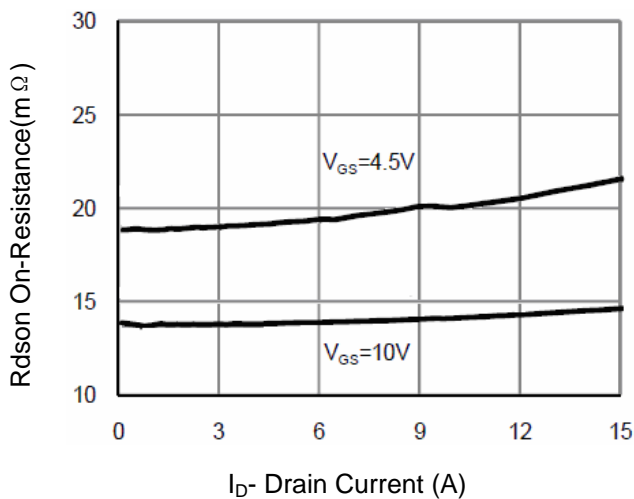


Figure 5 Drain-Source On-Resistance

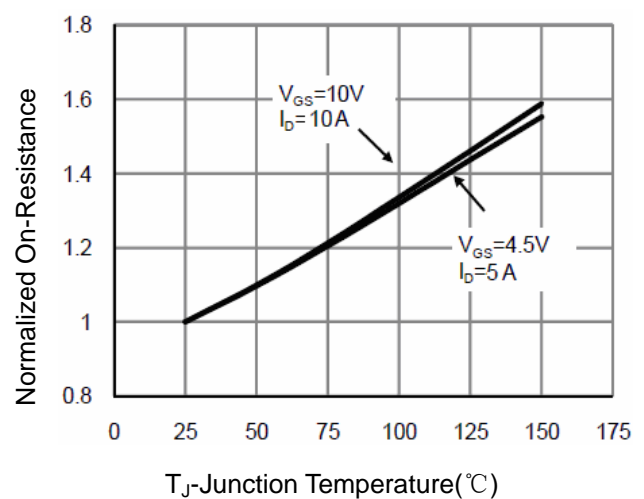
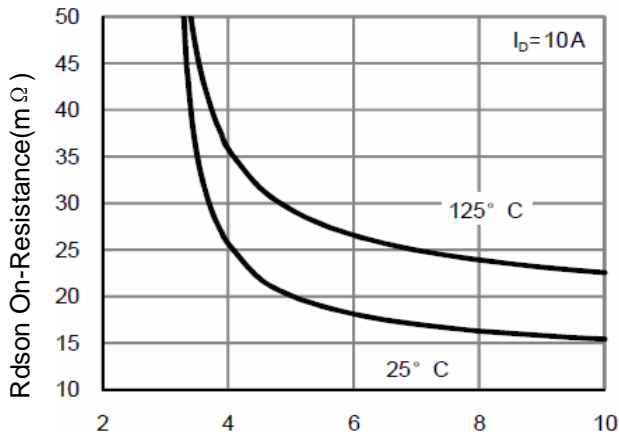
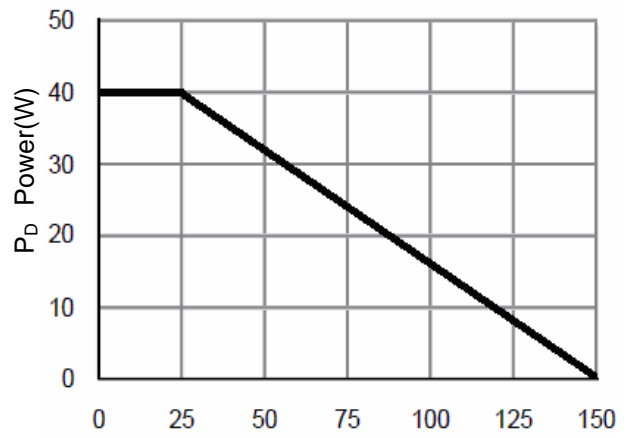


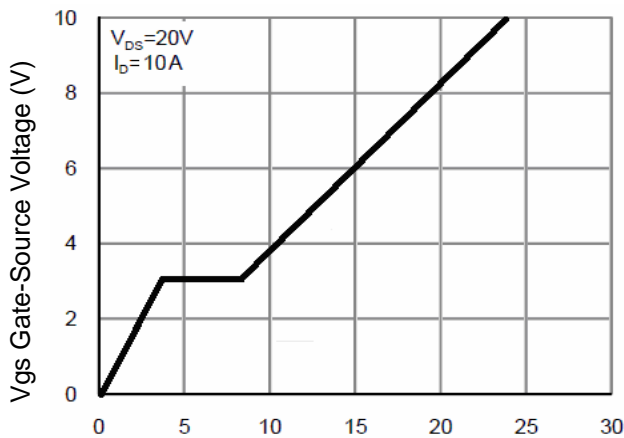
Figure 6 Drain-Source On-Resistance



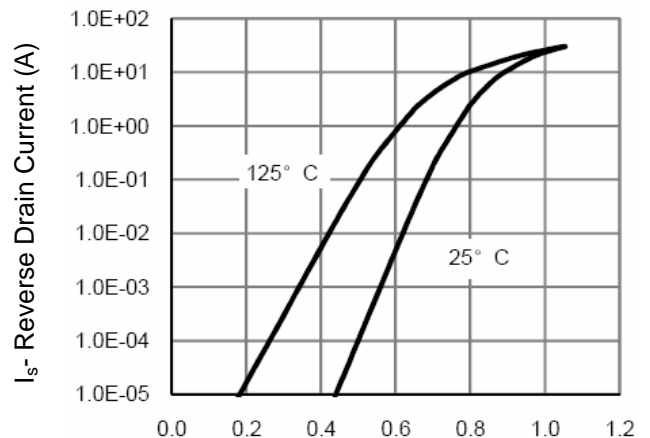
Vgs Gate-Source Voltage (V)
Figure 7 Rdson vs Vgs



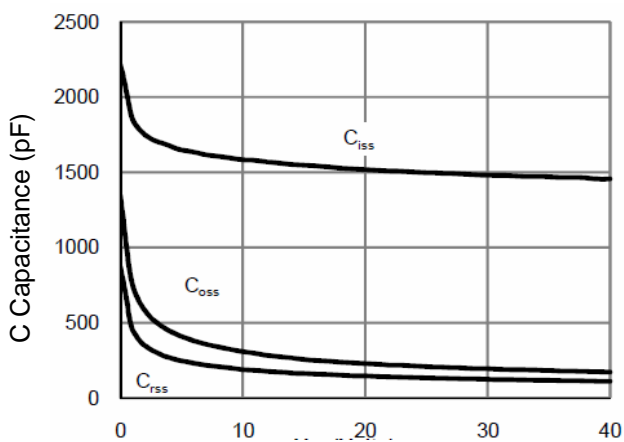
Tj Junction Temperature (°C)
Figure 8 Power Dissipation



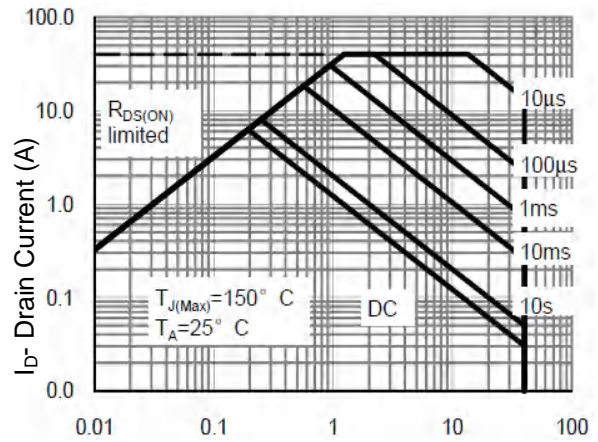
Qg Gate Charge (nC)
Figure 9 Gate Charge



Vds Drain-Source Voltage (V)
Figure 10 Source-Drain Diode Forward



Vds Drain-Source Voltage (V)
Figure 11 Capacitance vs Vds



Vds Drain-Source Voltage (V)
Figure 12 Safe Operation Area

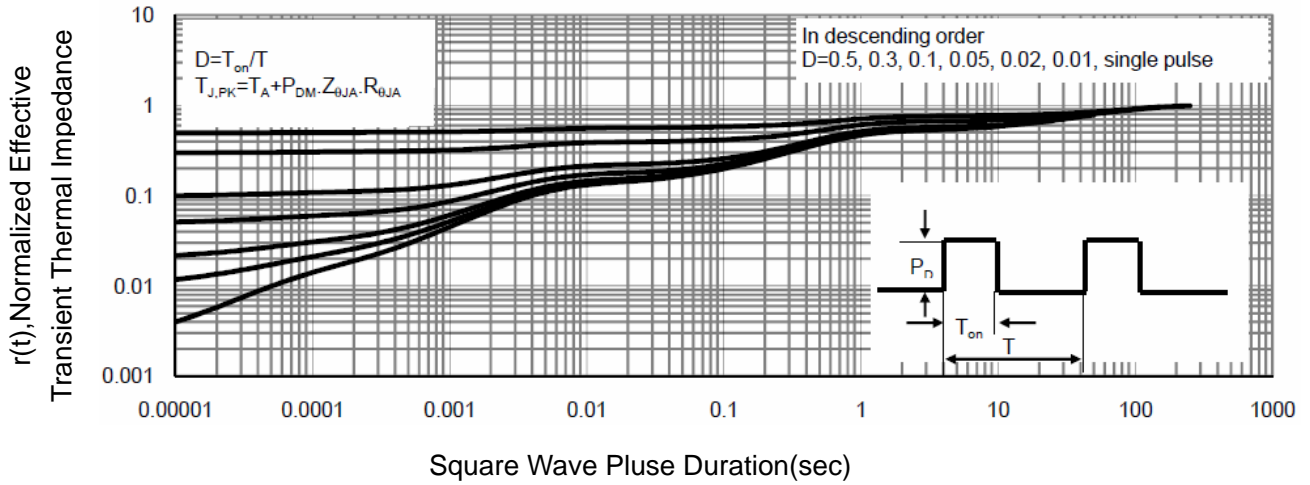


Figure 13 Normalized Maximum Transient Thermal Impedance



P- Channel Typical Electrical and Thermal Characteristics (Curves)

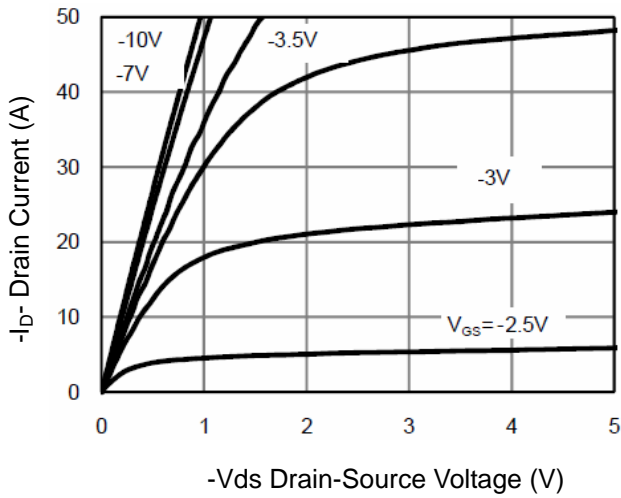


Figure 1 Output Characteristics

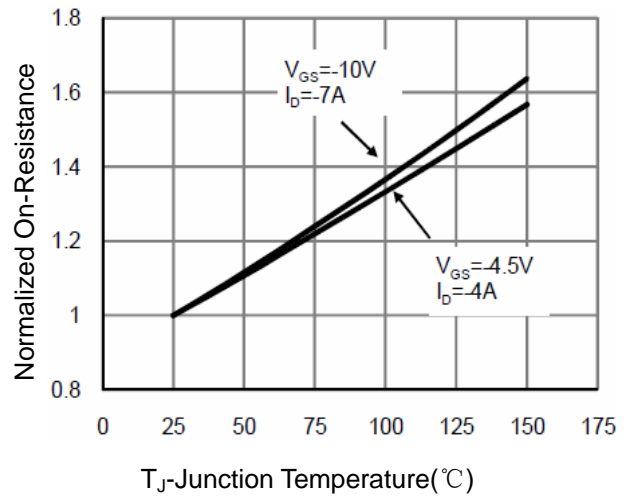


Figure 4 Rdson-Junction Temperature

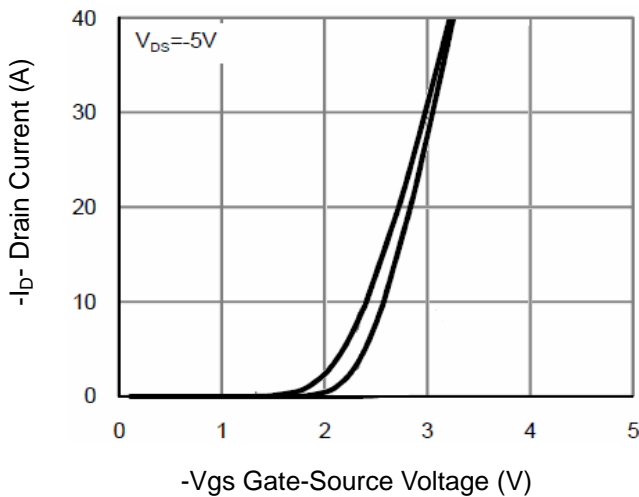


Figure 2 Transfer Characteristics

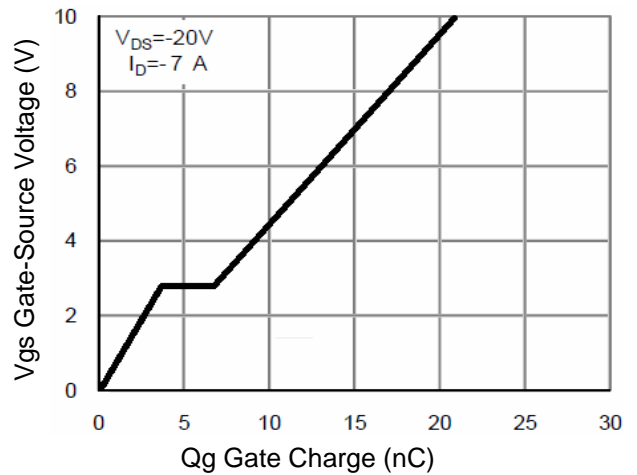


Figure 5 Gate Charge

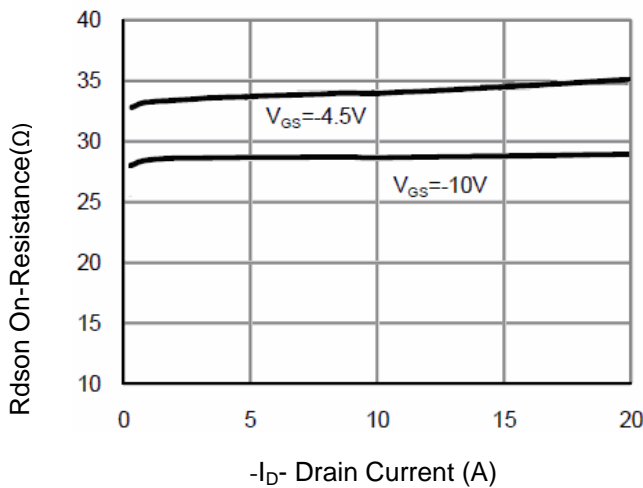


Figure 3 Rdson- Drain Current

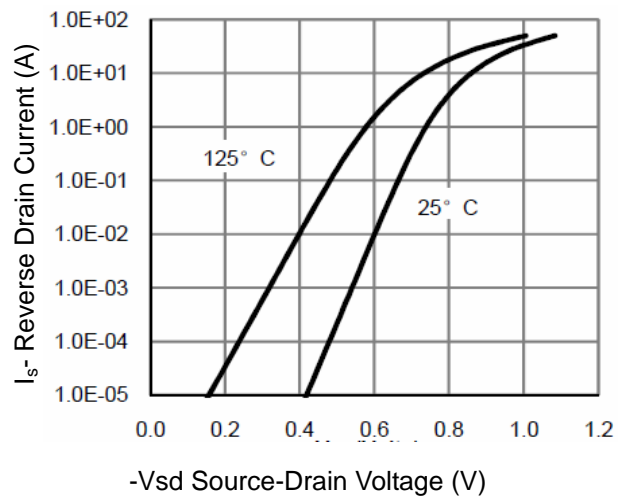


Figure 6 Source- Drain Diode Forward

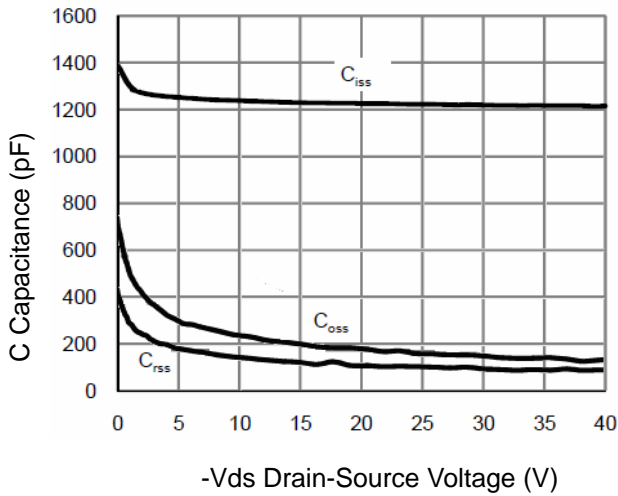


Figure 7 Capacitance vs Vds

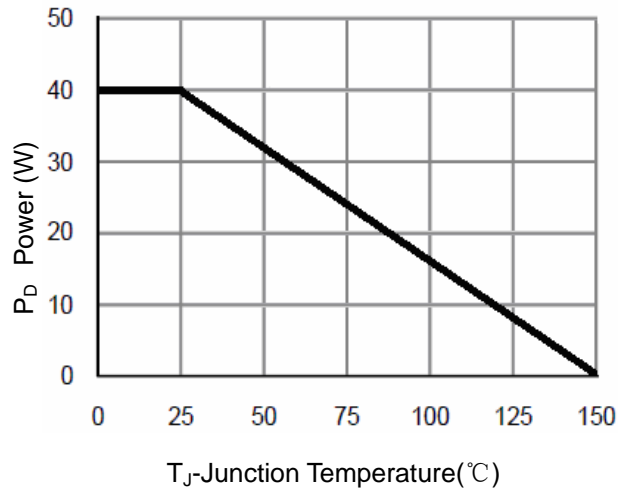


Figure 9 Power Dissipation

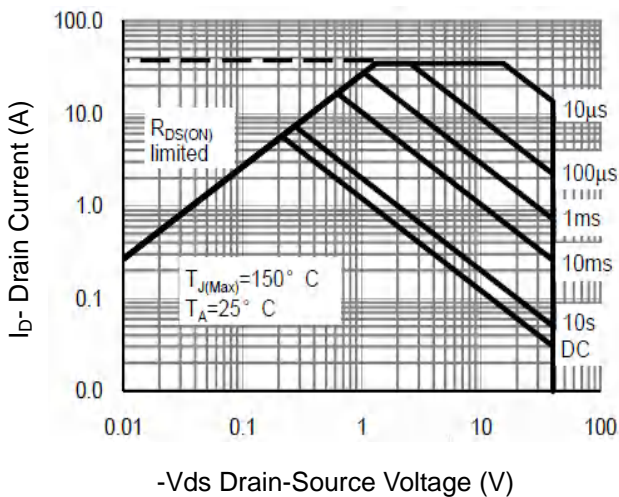


Figure 8 Safe Operation Area

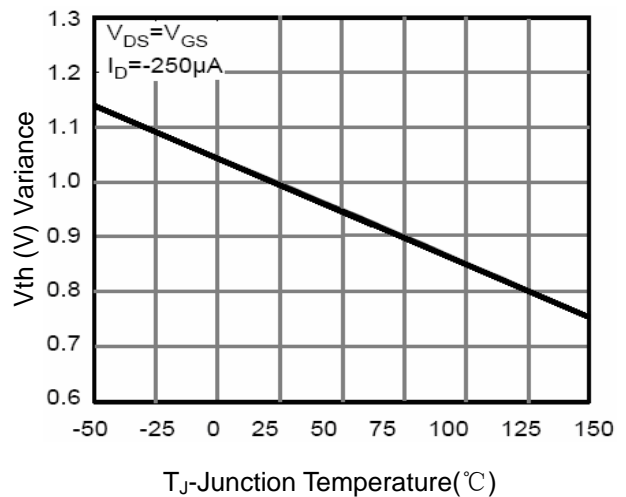


Figure 10 $V_{GS(th)}$ vs Junction Temperature

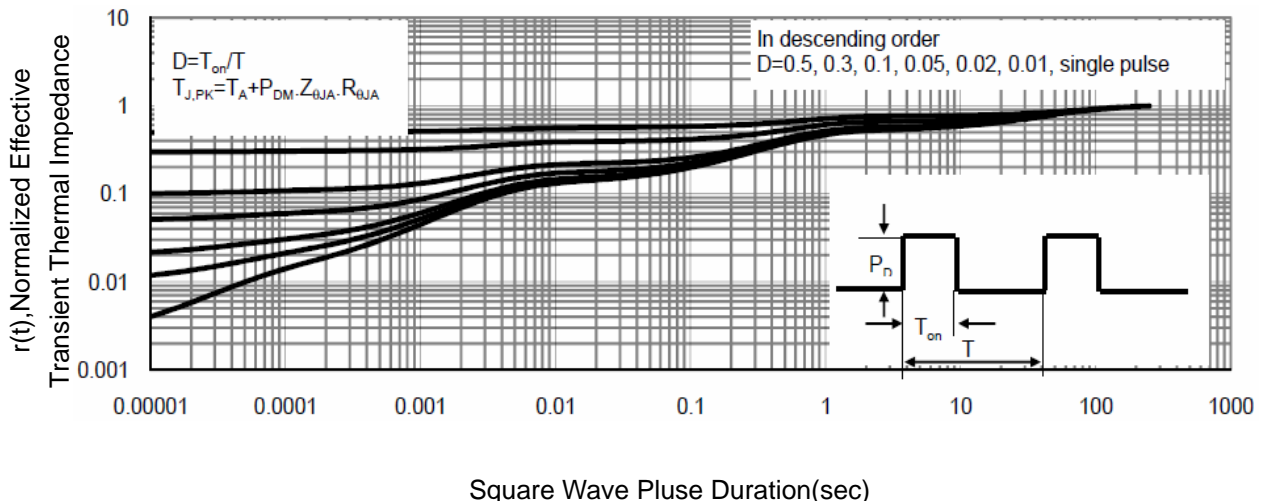
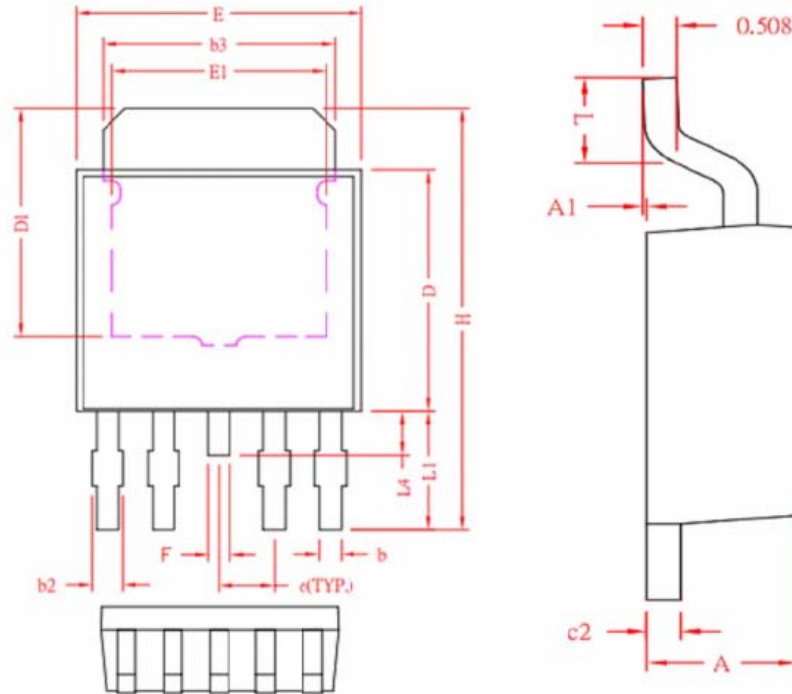


Figure 11 Normalized Maximum Transient Thermal Impedance



TO-252-4L Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|--------|-----------|------|-------|
| A | 2.20 | 2.30 | 2.40 |
| A1 | 0 | 0.08 | 0.15 |
| b | 0.45 | 0.53 | 0.60 |
| b2 | 0.50 | 0.65 | 0.80 |
| b3 | 5.20 | 5.35 | 5.50 |
| c2 | 0.45 | 0.50 | 0.55 |
| D | 5.40 | 5.60 | 5.80 |
| D1 | 4.57 | - | - |
| E | 6.40 | 6.60 | 6.80 |
| E1 | 3.81 | - | - |
| e | 1.27 REF. | | |
| F | 0.40 | 0.50 | 0.60 |
| H | 9.40 | 9.80 | 10.20 |
| L | 1.40 | 1.59 | 1.77 |
| L1 | 2.40 | 2.70 | 3.00 |
| L4 | 0.80 | 1.00 | 1.20 |



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