

AP2716SD

N and P-Channel Enhancement Mosfet

Feature

- **N-Channel**

$V_{DD}=40V, I_D=10A$

$R_{DS(on)} < 22m\Omega @ V_{GS}=10V$

$R_{DS(on)} < 30m\Omega @ V_{GS}=4.5V$

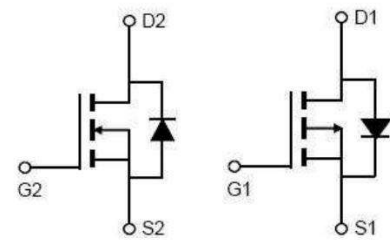
- **P-Channel**

$V_{DD}=-40V, I_D=-10A$

$R_{DS(on)} < 44m\Omega @ V_{GS}=-10V$

$R_{DS(on)} < 62m\Omega @ V_{GS}=-4.5V$

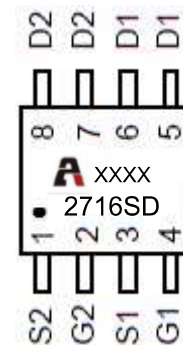
- Lead free product is acquired
- High power and current handling capability
- Surface mount package



N-channel

P-channel

Schematic diagram



Marking and pin assignment

Application

- PWM applications
- Load Switch
- Power management

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|----------|----------------|-----------|------------|----------------|
| 2716SD | AP2716SD | SOP-8 | 13 inch | - | 4000 |

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | N-Channel | P-Channel | Unit |
|--|-----------------|-----------|-----------|---------------------------|
| Drain-Source Voltage | V_{DS} | 40 | -40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | ± 20 | V |
| Continuous Drain Current ($T_a = 25^\circ\text{C}$) | I_D | 10 | -10 | A |
| Continuous Drain Current ($T_a = 100^\circ\text{C}$) | I_D | 6.5 | -6.5 | A |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | 40 | -40 | A |
| Power Dissipation | P_D | 4.0 | 7.5 | W |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 31.3 | 16.7 | $^\circ\text{C}/\text{W}$ |
| Junction Temperature | T_J | 150 | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55~ +150 | -55~ +150 | $^\circ\text{C}$ |

AP2716SD

N and P-Channel Enhancement Mosfet

AIIPOWER

DATA SHEET

N-CH ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---------------|--|-----|------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$ | 40 | | | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 100V, V_{GS} = 0V$ | | | 1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | | | ± 100 | nA |
| Gate threshold voltage ⁽²⁾ | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1 | 1.6 | 2.5 | V |
| Drain-source on-resistance ⁽²⁾ | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 10A$ | | 17 | 22 | m Ω |
| | | $V_{GS} = 4.5V, I_D = 6A$ | | 22 | 30 | |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$ | | 1050 | | pF |
| Output Capacitance | C_{oss} | | | 84 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 72 | | |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 20V, I_D = 5A, R_L = 6\Omega$ $V_{GS} = 10V, R_G = 1\Omega$ | | 11 | | ns |
| Turn-on rise time | t_r | | | 13 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 36 | | |
| Turn-off fall time | t_f | | | 9 | | |
| Total Gate Charge | Q_g | $V_{DS} = 20V, I_D = 5A,$ $V_{GS} = 10V$ | | 11 | | nC |
| Gate-Source Charge | Q_{gs} | | | 1.9 | | |
| Gate-Drain Charge | Q_{gd} | | | 2.2 | | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ⁽²⁾ | V_{DS} | $V_{GS} = 0V, I_S = 10A$ | | | 1.2 | V |
| Diode Forward current ⁽³⁾ | I_S | | - | - | 10 | A |

P-CH ELECTRICAL CHARACTERISTICS(T_a=25°C unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|----------------------|--|-----|------|------|------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | V _{(BR)DSS} | V _{GS} = 0V, I _D = -250μA | -40 | | | V |
| Zero gate voltage drain current | I _{DSS} | V _{DS} = 100V, V _{GS} = 0V | | | 1 | μA |
| Gate-body leakage current | I _{GSS} | V _{GS} = ±20V, V _{DS} = 0V | | | ±100 | nA |
| Gate threshold voltage ⁽²⁾ | V _{GS(th)} | V _{DS} = V _{GS} , I _D = -250μA | -1 | -1.7 | -2.5 | V |
| Drain-source on-resistance ⁽²⁾ | R _{DS(on)} | V _{GS} = -10V, I _D = -10A | | 35 | 44 | mΩ |
| | | V _{GS} = -4.5V, I _D = -6A | | 48 | 60 | |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} = -20V, V _{GS} = 0V, f = 1MHz | | 1160 | | pF |
| Output Capacitance | C _{oss} | | | 155 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 98 | | |
| Switching characteristics | | | | | | |
| Turn-on delay time | t _{d(on)} | V _{DD} = -20V, I _D = -5A, R _L = 6Ω V _{GS} = -10V, R _G = 1Ω | | 8 | | ns |
| Turn-on rise time | t _r | | | 15 | | |
| Turn-off delay time | t _{d(off)} | | | 23 | | |
| Turn-off fall time | t _f | | | 9 | | |
| Total Gate Charge | Q _g | V _{DS} = -20V, I _D = -5A, V _{GS} = -10V | | 20 | | nC |
| Gate-Source Charge | Q _{gs} | | | 3.5 | | |
| Gate-Drain Charge | Q _{gd} | | | 4.2 | | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ⁽²⁾ | V _{DS} | V _{GS} = 0V, I _S = -10A | | | 1.2 | V |
| Diode Forward current ⁽³⁾ | I _S | | - | - | -10 | A |

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width ≤ 300μs, duty cycle ≤ 2%
3. Surface Mounted on FR4 Board, t ≤ 10 sec

N-Channel

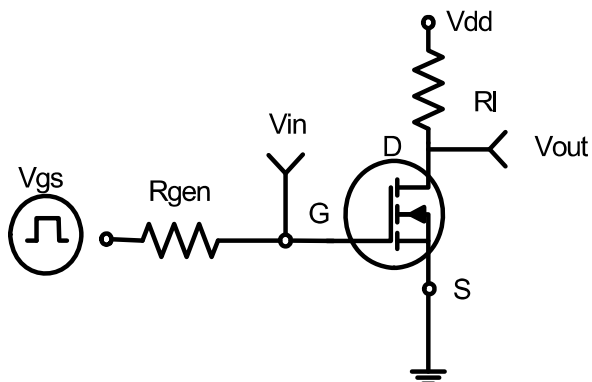


Figure 1: Switching Test Circuit

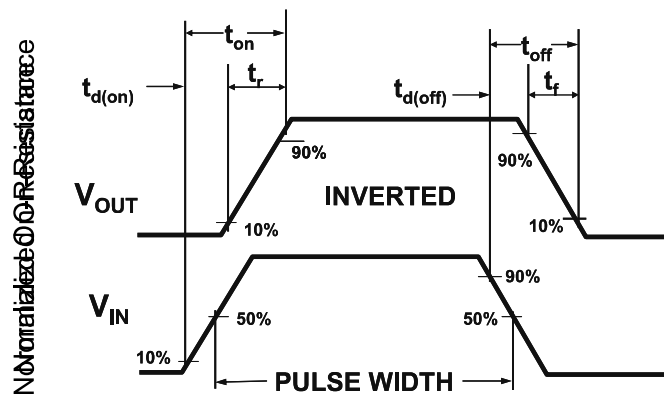


Figure 2: Switching Waveforms

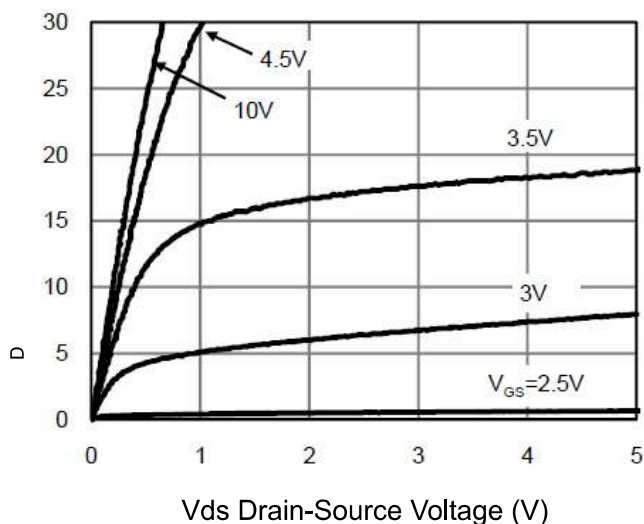


Figure 3 Output Characteristics

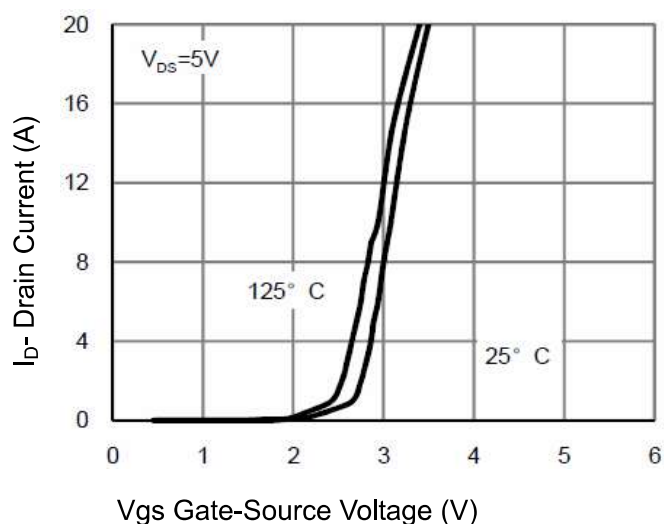


Figure 4 Transfer Characteristics

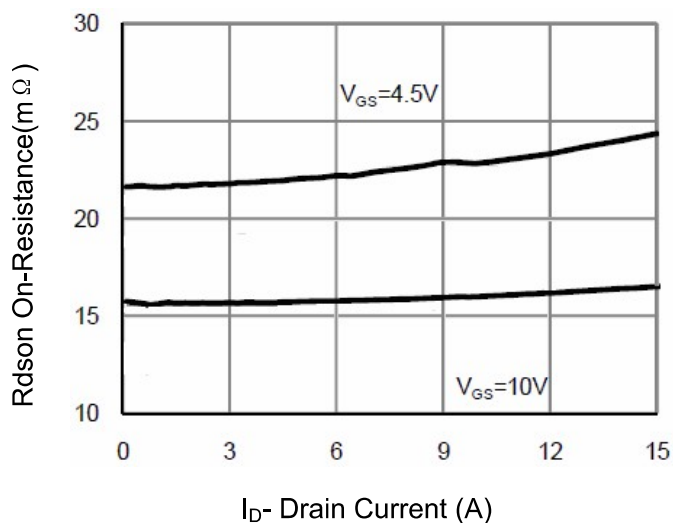


Figure 5 Drain-Source On-Resistance

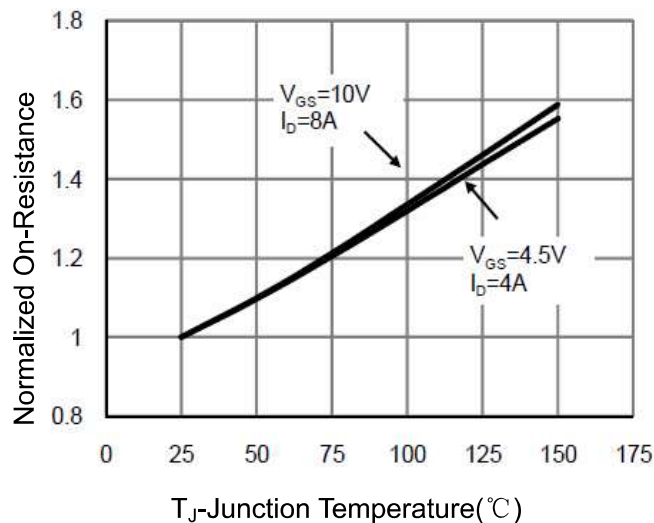
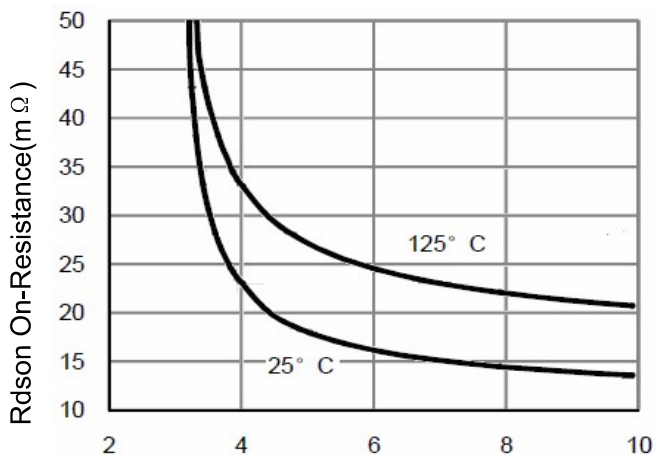
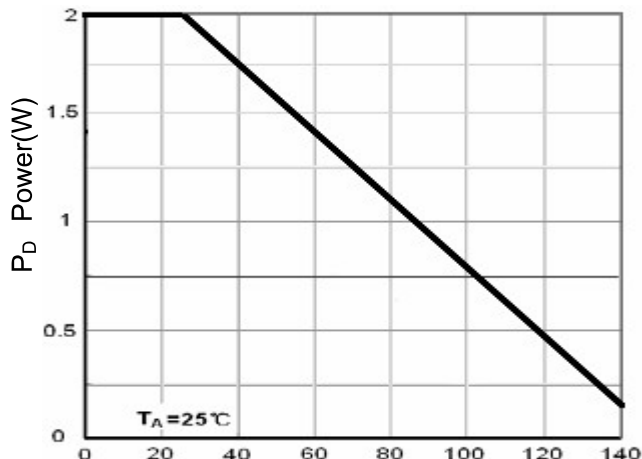


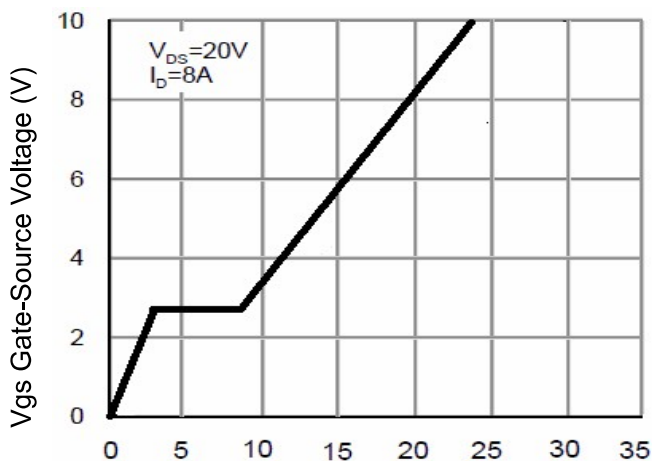
Figure 6 Drain-Source On-Resistance



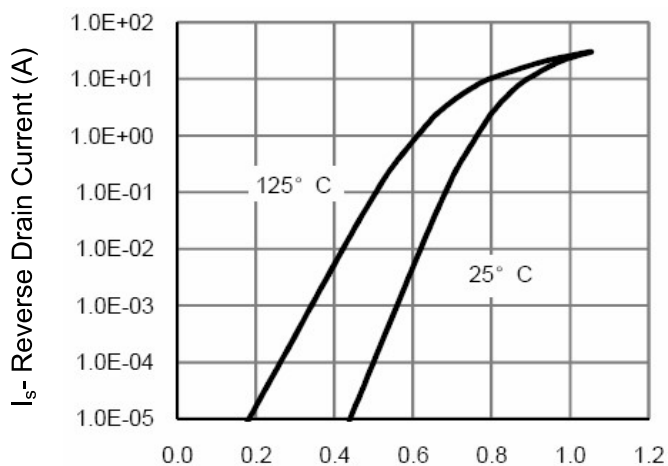
Vgs Gate-Source Voltage (V)
Figure 7 Rdson vs Vgs



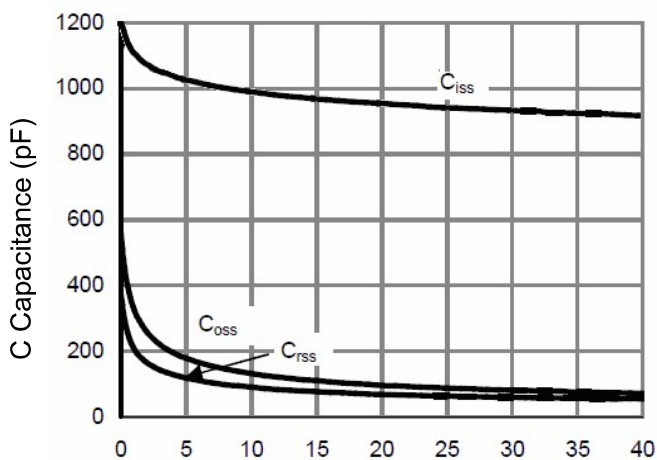
T_J-Junction Temperature(°C)
Figure 8 Power Dissipation



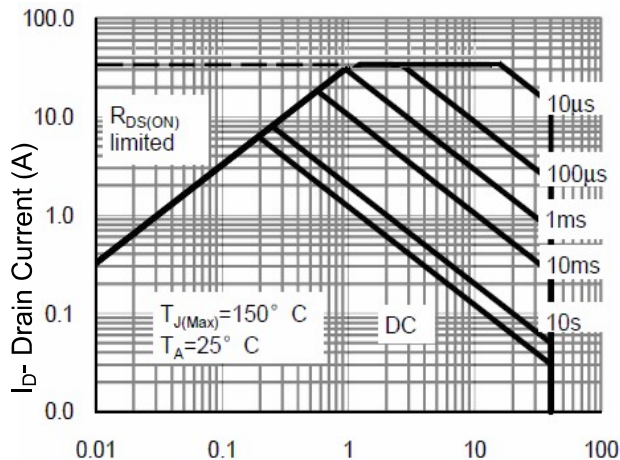
Qg Gate Charge (nC)
Figure 9 Gate Charge



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

P-Channel

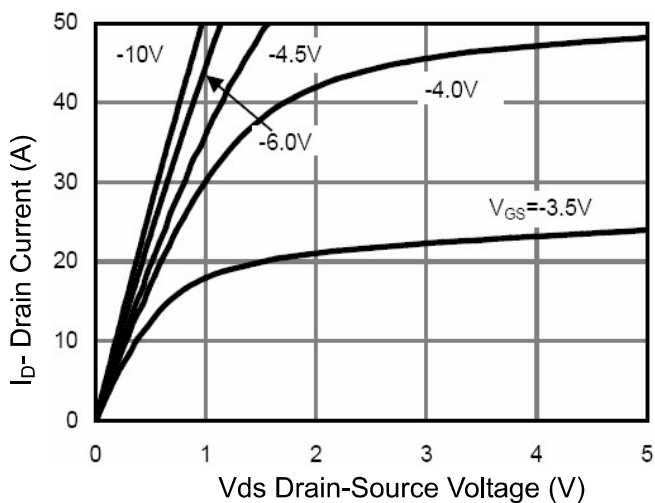


Figure 1 Output Characteristics

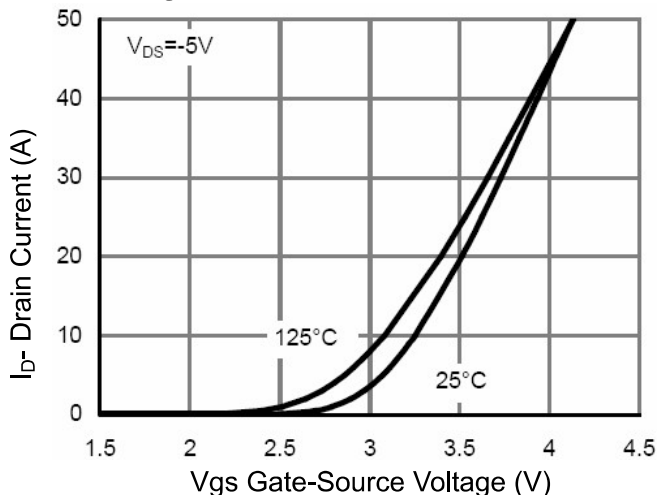


Figure 2 Transfer Characteristics

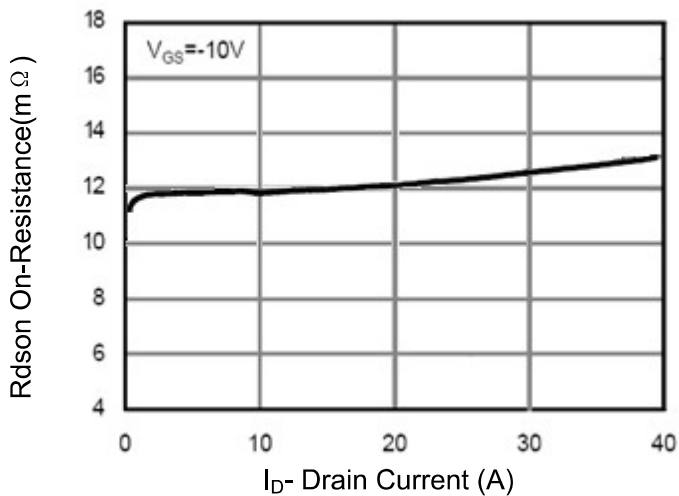


Figure 3 Rdson- Drain Current

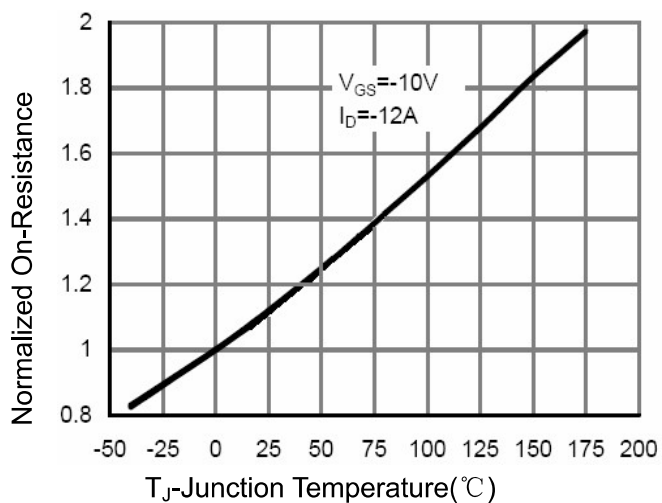


Figure 4 Rdson-Junction Temperature

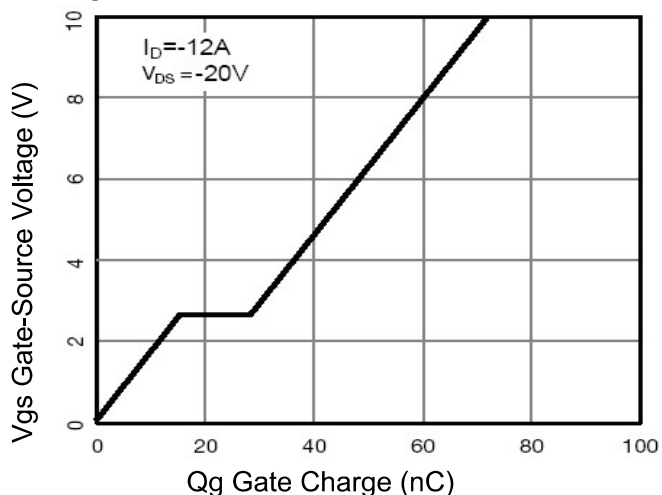


Figure 5 Gate Charge

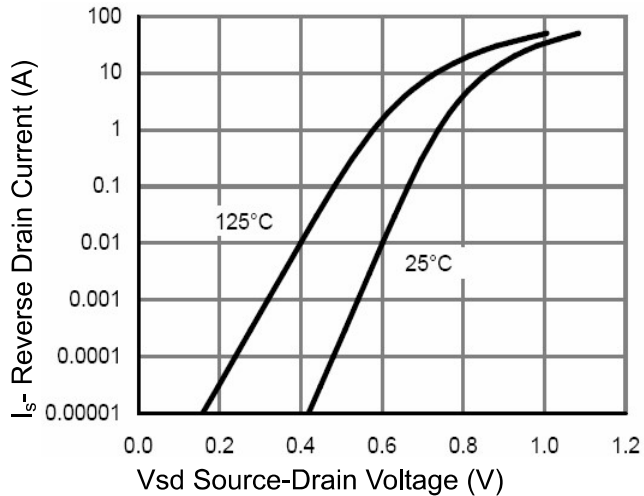


Figure 6 Source- Drain Diode Forward

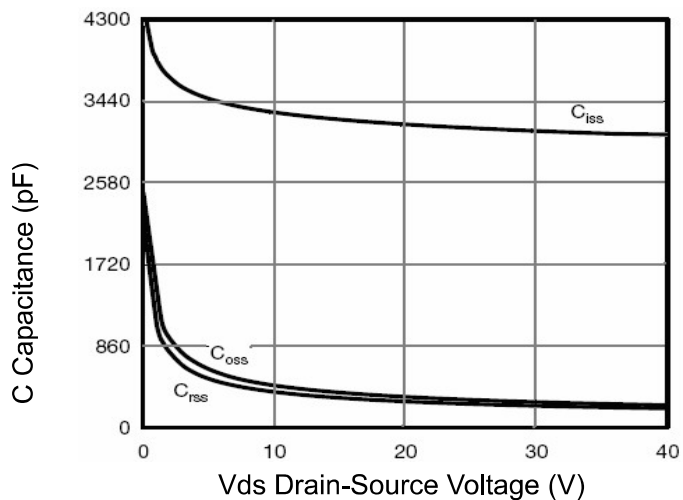


Figure 7 Capacitance vs Vds

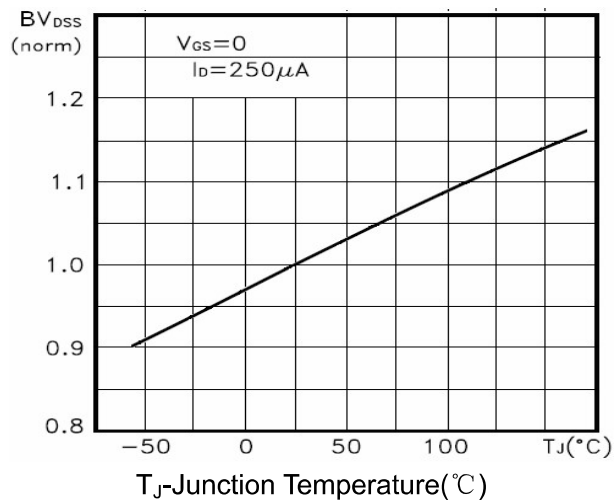


Figure 9 BV_{DSS} vs Junction Temperature

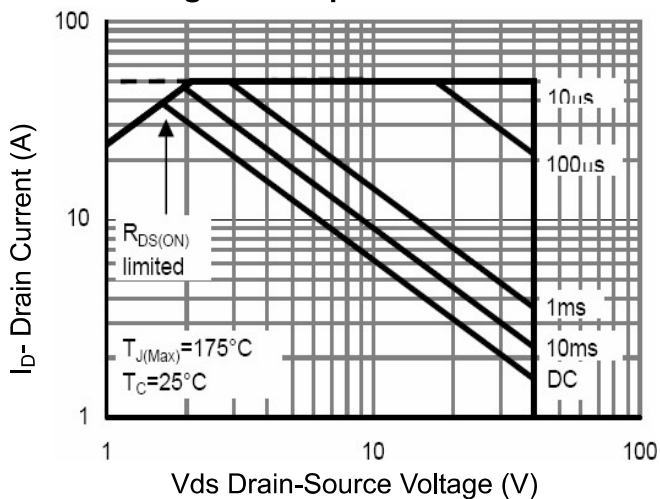


Figure 8 Safe Operation Area

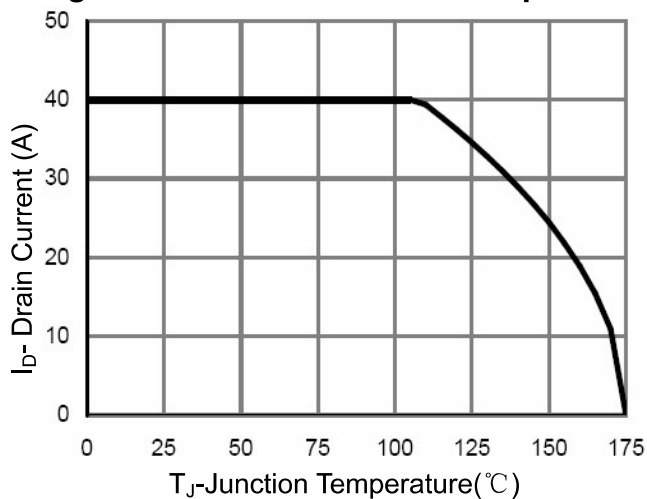


Figure 10 ID Current Derating vs Junction Temperature

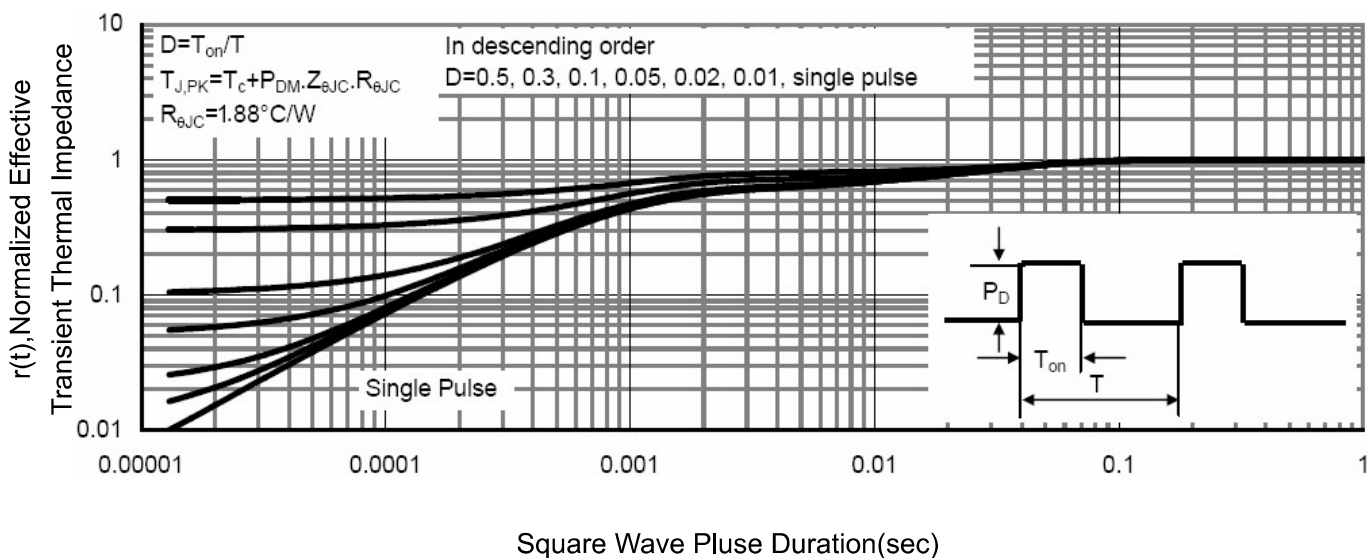
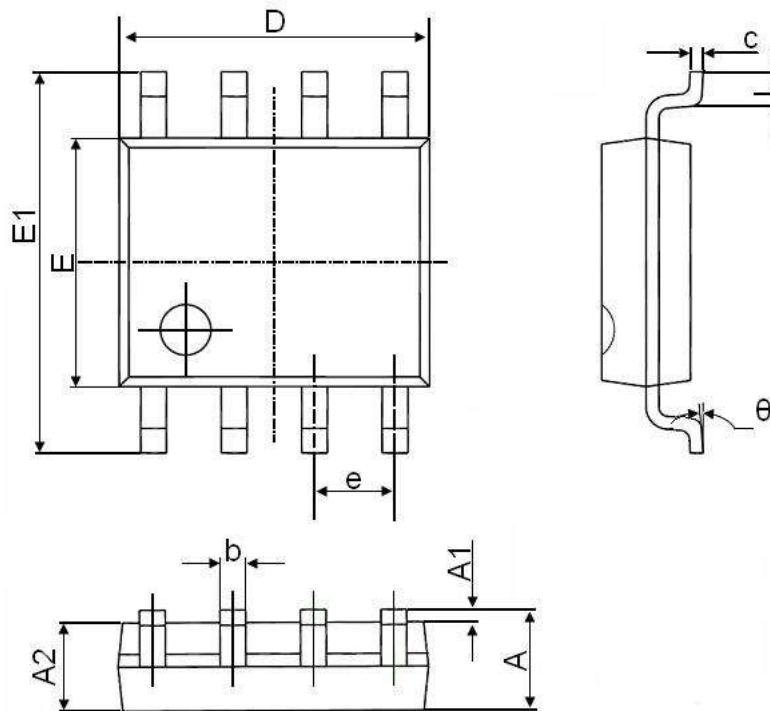


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



| 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° |