

Complementary MOSFET

2NP06

■ Features

● N-Channel

$$V_{DS} = 40V, I_D = 8A$$

$$R_{DS(ON)} < 13m\Omega @ V_{GS}=10V$$

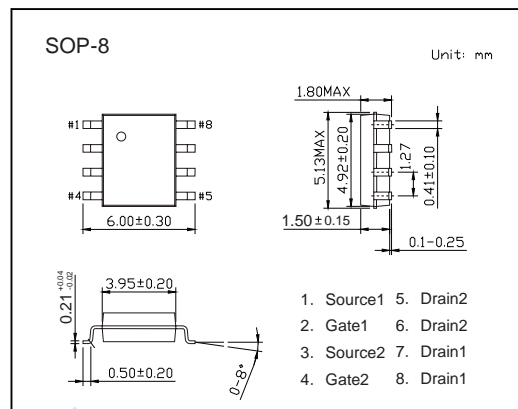
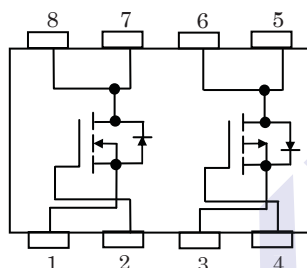
$$R_{DS(ON)} < 23m\Omega @ V_{GS}=4.5V$$

● P-Channel

$$V_{DS} = -40V, I_D = -7A$$

$$R_{DS(ON)} < 25m\Omega @ V_{GS}=-10V$$

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

■ Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$ Unless otherwise specified)

| Parameter | Symbol | N-Channel | P-Channel | Unit |
|---|-----------------|------------------------|-----------|---------------------------|
| Drain-Source Voltage | V_{DS} | 40 | -40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | ± 20 | |
| Continuous Drain Current | I_D | $T_C=25^\circ\text{C}$ | 8 | A |
| | | $T_C=70^\circ\text{C}$ | 5.7 | |
| Pulsed Drain Current (Note 1) | I_{DM} | 40 | -30 | |
| Maximum Power Dissipation | P_D | 2 | | W |
| Thermal Resistance, Junction- to-Ambient (Note 2) | $R_{\theta JA}$ | 62.5 | | $^\circ\text{C}/\text{W}$ |
| Junction Temperature | T_J | 150 | | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -55 to 150 | | |

Notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on FR4 Board, $t \leq 10$ sec.

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■ Electrical Characteristics (Ta = 25°C Unless otherwise specified)

| Parameter | Symbol | Test Conditions | Type | Min | Typ | Max | Unit | | |
|---|---------------------|---|--|------|------|------|------|----|---|
| Off Characteristics | | | | | | | | | |
| Drain-Source Breakdown Voltage | V _{DSS} | I _D =250μA, V _{GS} =0V | N-CH | 40 | | | V | | |
| | | I _D =-250μA, V _{GS} =0V | P-CH | -40 | | | | | |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =40V, V _{GS} =0V | N-CH | | | 1 | μA | | |
| | | V _{DS} =-40V, V _{GS} =0V | P-CH | | | -1 | | | |
| Gate-Body Leakage Current | I _{GSS} | V _{DS} =0V, V _{GS} =±20V | N-CH | | | ±100 | nA | | |
| | | V _{DS} =0V, V _{GS} =±20V | P-CH | | | ±100 | | | |
| On Characteristics (Note 3) | | | | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | N-CH | 1 | | 2.5 | V | | |
| | | V _{DS} =V _{GS} , I _D =-250μA | P-CH | -1 | | -2.5 | | | |
| Static Drain-Source On-Resistance | R _{DS(on)} | V _{GS} =10V, I _D =8A | N-CH | | 10.6 | 13 | mΩ | | |
| | | V _{GS} =4.5V, I _D =4A | | | 15 | 23 | | | |
| | | V _{GS} =-10V, I _D =-7A | P-CH | | 16 | 25 | | | |
| | | V _{GS} =-4.5V, I _D =-4A | | | 21 | 30 | | | |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =8A | N-CH | 33 | | | S | | |
| | | V _{DS} =-5V, I _D =-7A | P-CH | 20 | | | | | |
| Dynamic Characteristics (Note 4) | | | | | | | | | |
| Input Capacitance | C _{iss} | N-Channel: V _{GS} =0V, V _{DS} =20V, f=1MHz P-Channel: V _{GS} =0V, V _{DS} =-20V, f=1MHz | N-CH | | 415 | | pF | | |
| | | | P-CH | | 1750 | | | | |
| Output Capacitance | C _{oss} | | N-CH | | 112 | | | | |
| | | | P-CH | | 215 | | | | |
| Reverse Transfer Capacitance | C _{rss} | | N-CH | | 11 | | | | |
| | | | P-CH | | 180 | | | | |
| Switching Characteristics (Note 4) | | | | | | | | | |
| Total Gate Charge | Q _g | N-Channel: V _{GS} =10V, V _{DS} =20V, I _D =8A P-Channel: V _{GS} =-10V, V _{DS} =-20V, I _D =-7A | N-CH | | 24 | | nC | | |
| | | | P-CH | | 13 | | | | |
| Gate Source Charge | Q _{gs} | | N-CH | | 3.5 | | | | |
| | | | P-CH | | 3.8 | | | | |
| Gate Drain Charge | Q _{gd} | | N-CH | | 6 | | | | |
| | | | P-CH | | 3.1 | | | | |
| Turn-On Delay Time | t _{d(on)} | | N-Channel: V _{DD} =20V, R _L =2Ω V _{GS} =10V, R _{GEN} =3Ω P-Channel: V _{DD} =-20V, R _L =2.3Ω V _{GS} =-10V, R _{GEN} =6Ω | N-CH | | 9 | | ns | |
| | | | | P-CH | | 7.5 | | | |
| Turn-On Rise Time | t _r | | | N-CH | | 8 | | | |
| | | | | P-CH | | 5.5 | | | |
| Turn-Off Delay Time | t _{d(off)} | | | N-CH | | 28 | | | |
| | | | | P-CH | | 19 | | | |
| Turn-Off Fall Time | t _f | N-CH | | | 10 | | | | |
| | | P-CH | | | 7 | | | | |
| Drain-Source Diode Characteristics | | | | | | | | | |
| Diode Forward Voltage | V _{SD} | I _S =8A, V _{GS} =0V | | N-CH | | 0.8 | 1.2 | | V |
| | | I _S =-1.3A, V _{GS} =0V | | P-CH | | -0.8 | -1.2 | | |

Notes 3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

■ Marking

| | |
|---------|---------------|
| Marking | NP06 KA*** |
|---------|---------------|

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■ N-Channel Typical Electrical and Thermal Characteristics Curves

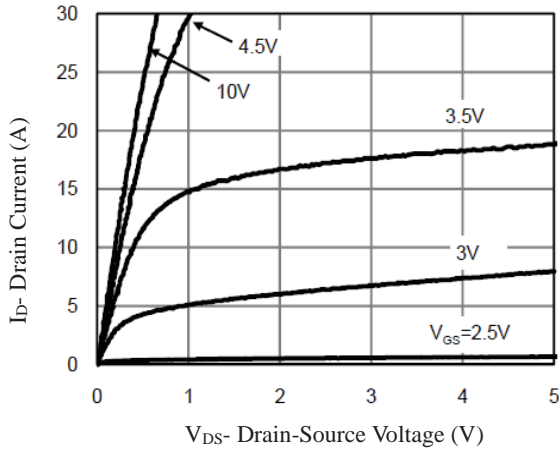


Figure 1. Output Characteristics

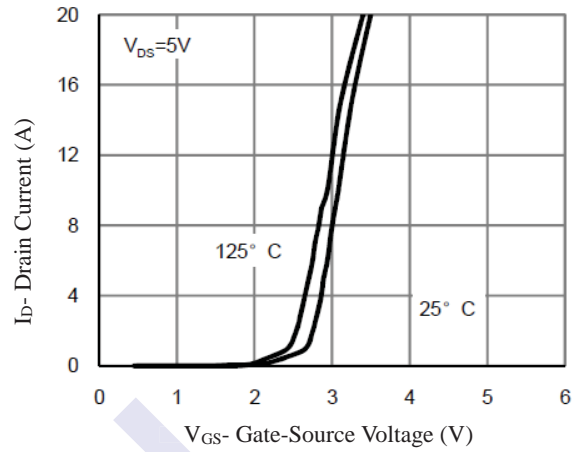


Figure 4. Transfer Characteristics

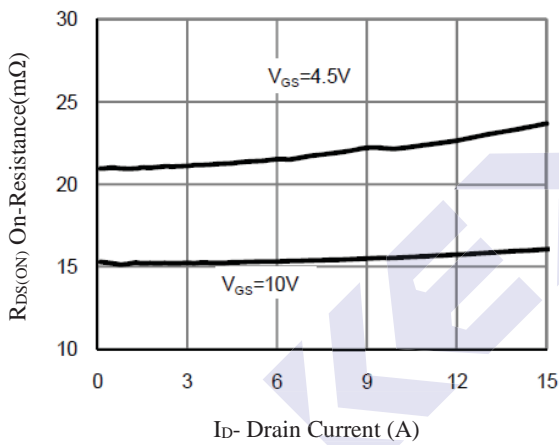


Figure 2. Drain-Source On-Resistance

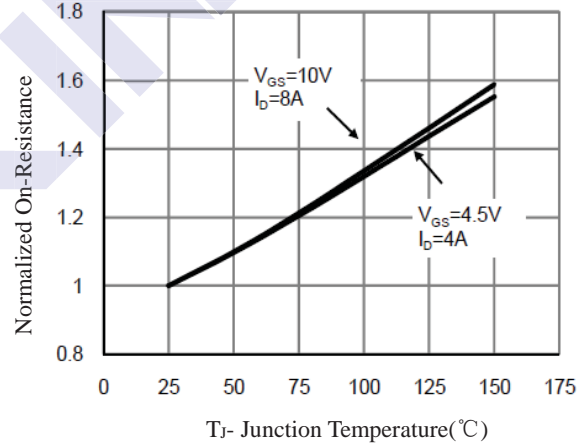


Figure 5. Drain-Source On-Resistance

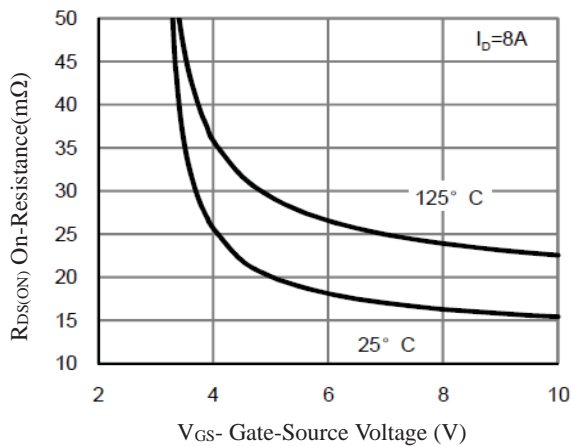


Figure 3. $R_{DS(ON)}$ vs V_{GS}

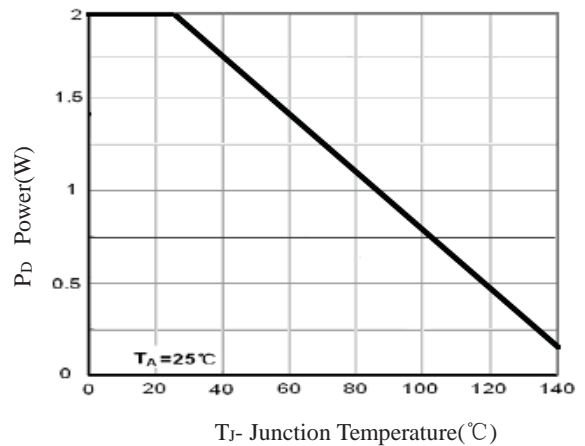


Figure 6. Power Dissipation

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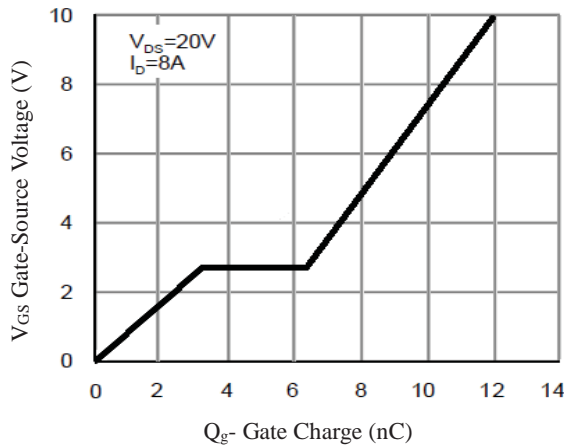


Figure 7 Gate Charge

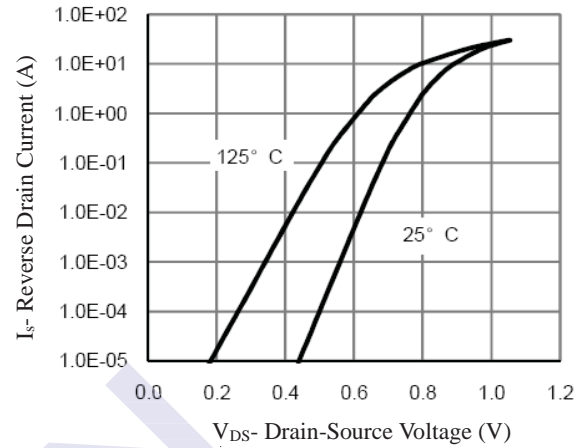


Figure 9. Source-Drain Diode Forward

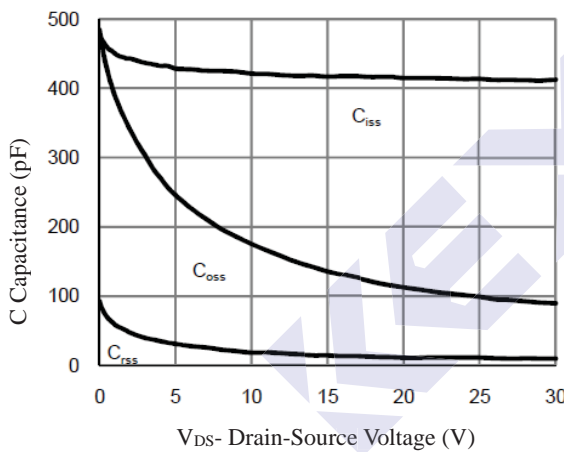


Figure 8. Capacitance vs VDS

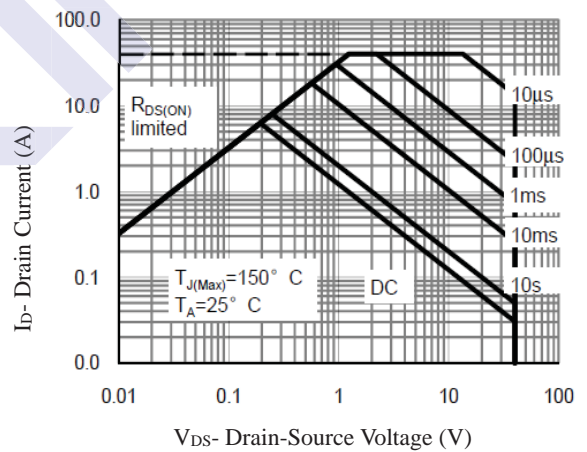


Figure 10. Safe Operation Area

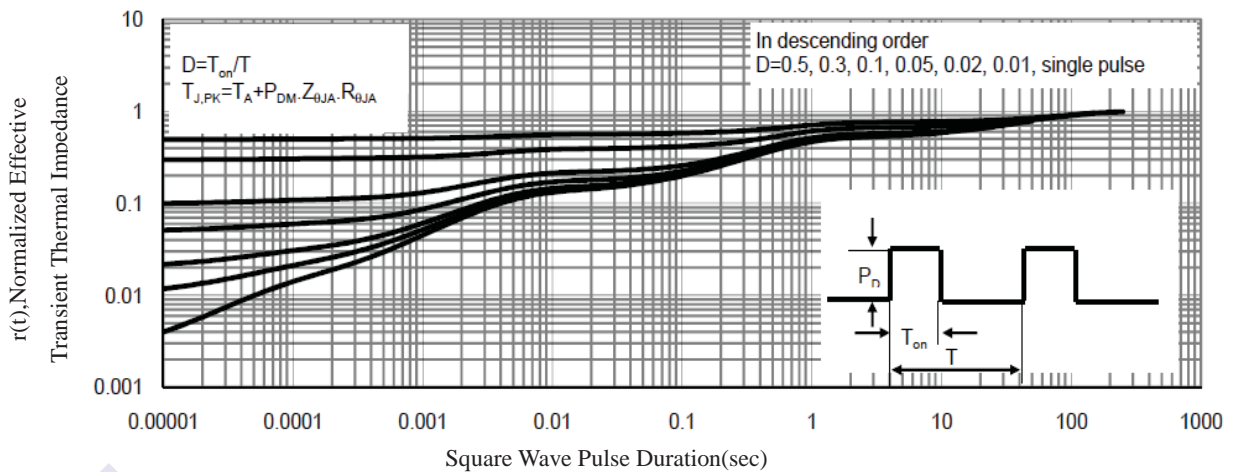


Figure 11. Normalized Maximum Transient Thermal Impedance

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■ P-Channel Typical Electrical and Thermal Characteristics Curves

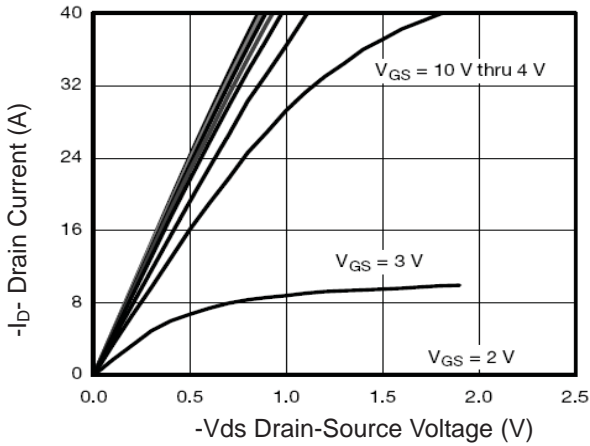


Figure 1 Output Characteristics

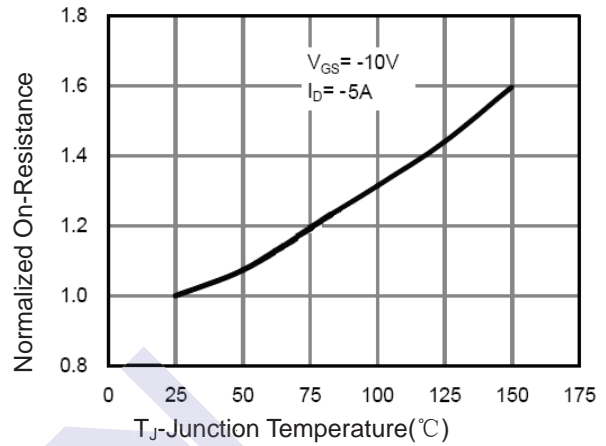


Figure 4 R_{dson} -Junction Temperature

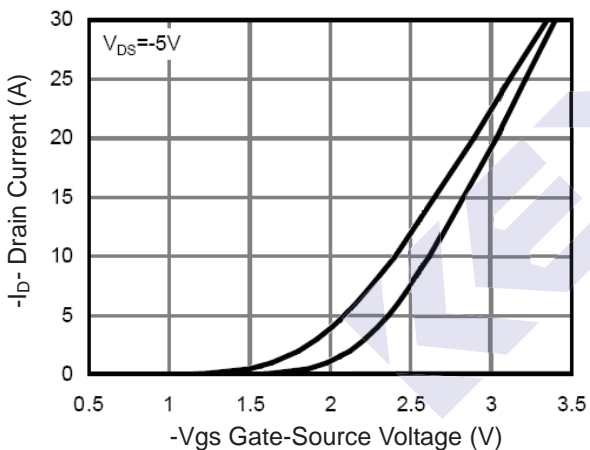


Figure 2 Transfer Characteristics

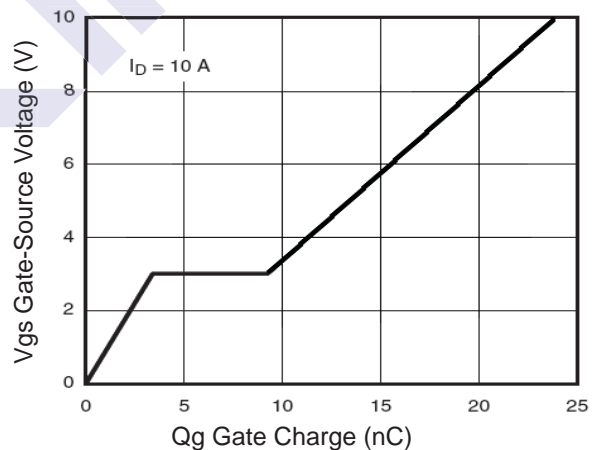


Figure 5 Gate Charge

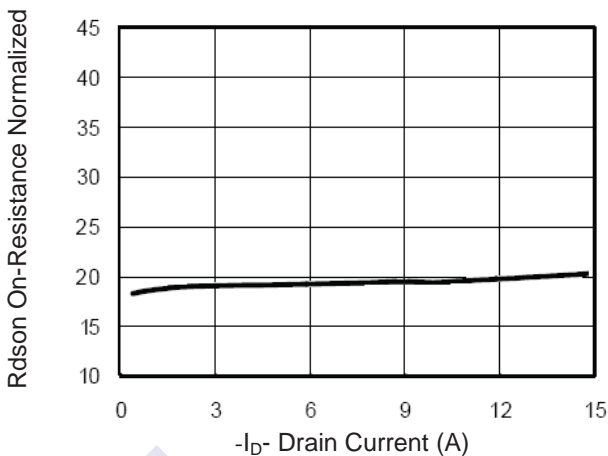


Figure 3 R_{dson} - Drain Current

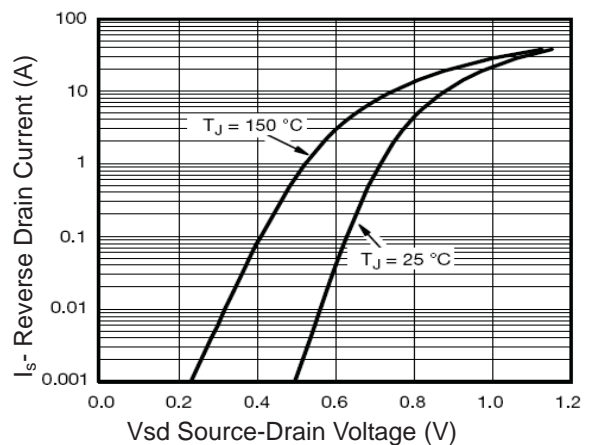


Figure 6 Source- Drain Diode Forward

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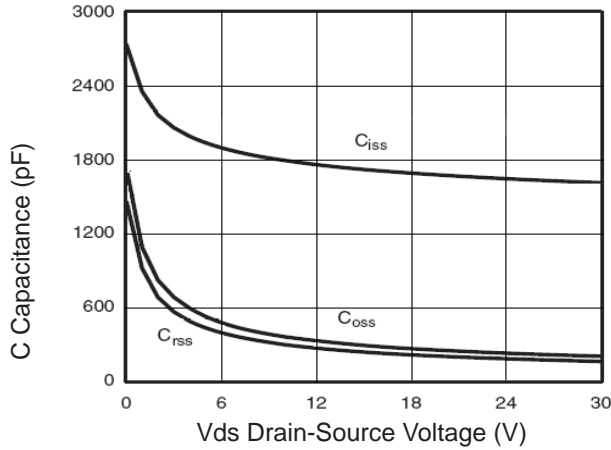


Figure 7 Capacitance vs Vds

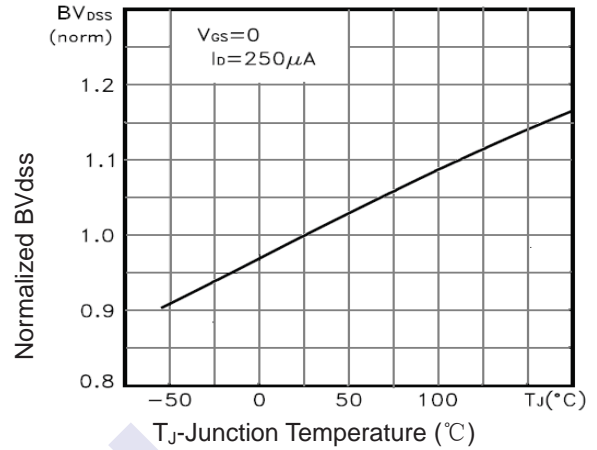


Figure 9 BV_{DSS} vs Junction Temperature

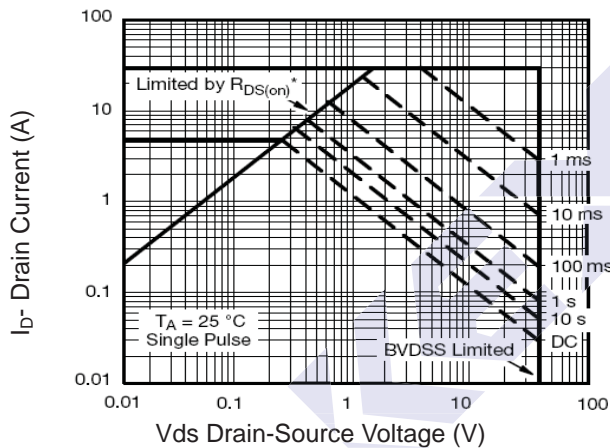


Figure 8 Safe Operation Area

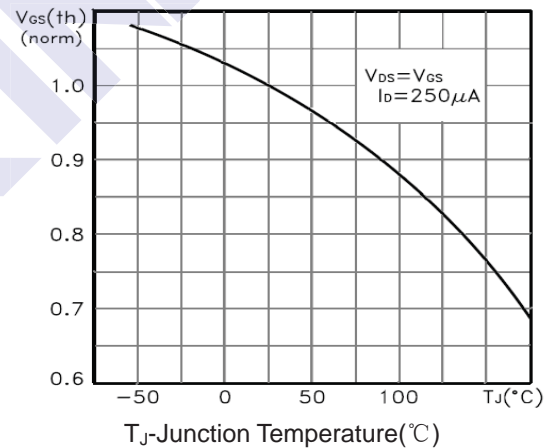


Figure 10 $V_{GS(th)}$ vs Junction Temperature

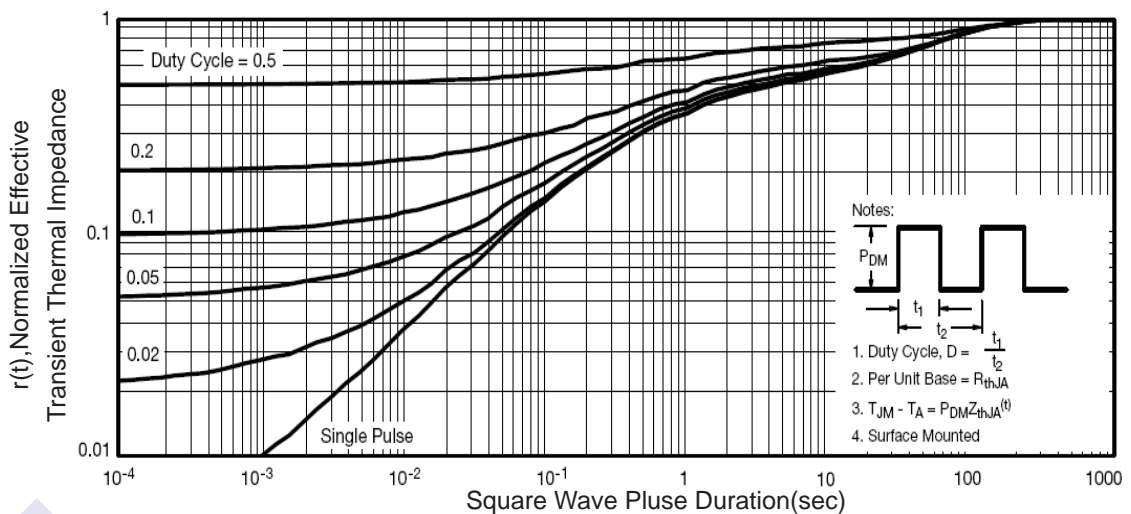


Figure 11 Normalized Maximum Transient Thermal Impedance