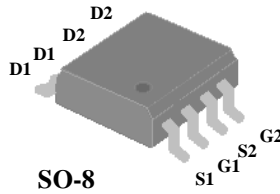




- ▼ Simple Drive Requirement
- ▼ Low On-resistance
- ▼ Fast Switching Performance
- ▼ RoHS Compliant & Halogen-Free

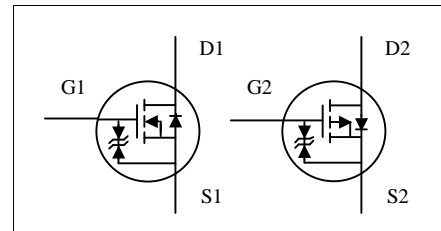


| | | |
|------|--------------|--------------|
| N-CH | BV_{DSS} | 40V |
| | $R_{DS(ON)}$ | 28m Ω |
| | I_D | 6A |
| P-CH | BV_{DSS} | -40V |
| | $R_{DS(ON)}$ | 42m Ω |
| | I_D | -5A |

Description

AP4525 series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The SO-8 package is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for voltage conversion or switch applications.



Absolute Maximum Ratings @ $T_j=25^\circ\text{C}$ (unless otherwise specified)

| Symbol | Parameter | Rating | | Units |
|------------------------------|--------------------------------------|------------|-----------|---------------------|
| | | N-channel | P-channel | |
| V_{DS} | Drain-Source Voltage | 40 | -40 | V |
| V_{GS} | Gate-Source Voltage | ± 16 | ± 16 | V |
| $I_D @ T_A=25^\circ\text{C}$ | Drain Current, $V_{GS} @ 10V^3$ | 6.0 | -5.0 | A |
| $I_D @ T_A=70^\circ\text{C}$ | Drain Current, $V_{GS} @ 10V^3$ | 5.0 | -4.0 | A |
| I_{DM} | Pulsed Drain Current ¹ | 30 | -30 | A |
| $P_D @ T_A=25^\circ\text{C}$ | Total Power Dissipation | 2.0 | | W |
| | Linear Derating Factor | 0.016 | | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | | $^\circ\text{C}$ |

Thermal Data

| Symbol | Parameter | Value | Unit |
|--------|-----------------------------------------------------------|-------|---------------------------|
| Rthj-a | Maximum Thermal Resistance, Junction-ambient ³ | 62.5 | $^\circ\text{C}/\text{W}$ |



AP4525GEM-HF

N-CH Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|------------------------------|---------------------------------------------------------|----------------------------------------------------|------|------|----------|--------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 40 | - | - | V |
| $\Delta BV_{DSS}/\Delta T_j$ | Breakdown Voltage Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | - | 0.04 | - | $V/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=6A$ | - | - | 28 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=4A$ | - | - | 32 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | - | 3 | V |
| g_{fs} | Forward Transconductance | $V_{DS}=10V, I_D=6A$ | - | 6 | - | S |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=40V, V_{GS}=0V$ | - | - | 1 | μA |
| | Drain-Source Leakage Current ($T_j=70^\circ\text{C}$) | $V_{DS}=32V, V_{GS}=0V$ | - | - | 25 | μA |
| I_{GSS} | Gate-Source Leakage | $V_{GS}=\pm 16V, V_{DS}=0V$ | - | - | ± 30 | μA |
| Q_g | Total Gate Charge | $I_D=6A$ | - | 8 | 13 | nC |
| Q_{gs} | Gate-Source Charge | $V_{DS}=20V$ | - | 1.5 | - | nC |
| Q_{gd} | Gate-Drain ("Miller") Charge | $V_{GS}=4.5V$ | - | 4 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}=20V$ | - | 7 | - | ns |
| t_r | Rise Time | $I_D=6A$ | - | 20 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G=3\Omega, V_{GS}=10V$ | - | 20 | - | ns |
| t_f | Fall Time | $R_D=3.3\Omega$ | - | 4 | - | ns |
| C_{iss} | Input Capacitance | $V_{GS}=0V$ | - | 580 | 930 | pF |
| C_{oss} | Output Capacitance | $V_{DS}=25V$ | - | 100 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | $f=1.0\text{MHz}$ | - | 70 | - | pF |
| R_g | Gate Resistance | $f=1.0\text{MHz}$ | - | 2 | 3 | Ω |

Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|----------|---------------------------------|-----------------------|------|------|------|-------|
| V_{SD} | Forward On Voltage ² | $I_S=1.1A, V_{GS}=0V$ | - | - | 1.8 | V |
| t_{rr} | Reverse Recovery Time | $I_S=6A, V_{GS}=0V$ | - | 20 | - | ns |
| Q_{rr} | Reverse Recovery Charge | $dI/dt=100A/\mu s$ | - | 12 | - | nC |

**P-CH Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|------------------------------|---------------------------------------------------------|--------------------------------------------------|------|-------|----------|--------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -40 | - | - | V |
| $\Delta BV_{DSS}/\Delta T_j$ | Breakdown Voltage Temperature Coefficient | Reference to $25^\circ\text{C}, I_D=-1\text{mA}$ | - | -0.02 | - | $V/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=-10V, I_D=-5A$ | - | - | 42 | $\text{m}\Omega$ |
| | | $V_{GS}=-4.5V, I_D=-3A$ | - | - | 60 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.8 | - | -2.5 | V |
| g_{fs} | Forward Transconductance | $V_{DS}=-10V, I_D=-5A$ | - | 5 | - | S |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=-40V, V_{GS}=0V$ | - | - | -1 | μA |
| | Drain-Source Leakage Current ($T_j=70^\circ\text{C}$) | $V_{DS}=-32V, V_{GS}=0V$ | - | - | -25 | μA |
| I_{GSS} | Gate-Source Leakage | $V_{GS}=\pm 16V, V_{DS}=0V$ | - | - | ± 30 | μA |
| Q_g | Total Gate Charge | $I_D=-5A$ | - | 9 | 24 | nC |
| Q_{gs} | Gate-Source Charge | $V_{DS}=-20V$ | - | 2 | - | nC |
| Q_{gd} | Gate-Drain ("Miller") Charge | $V_{GS}=-4.5V$ | - | 5 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}=-20V$ | - | 8.5 | - | ns |
| t_r | Rise Time | $I_D=-5A$ | - | 15 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G=3\Omega, V_{GS}=-10V$ | - | 27 | - | ns |
| t_f | Fall Time | $R_D=4\Omega$ | - | 25 | - | ns |
| C_{iss} | Input Capacitance | $V_{GS}=0V$ | - | 770 | 1230 | pF |
| C_{oss} | Output Capacitance | $V_{DS}=-20V$ | - | 165 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | $f=1.0\text{MHz}$ | - | 115 | - | pF |
| R_g | Gate Resistance | $f=1.0\text{MHz}$ | - | 6 | 9 | Ω |

Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|----------|---------------------------------|------------------------|------|------|------|-------|
| V_{SD} | Forward On Voltage ² | $I_S=-1.1A, V_{GS}=0V$ | - | - | -1.8 | V |
| t_{rr} | Reverse Recovery Time | $I_S=-5A, V_{GS}=0V$ | - | 20 | - | ns |
| Q_{rr} | Reverse Recovery Charge | $di/dt=-100A/\mu s$ | - | 16 | - | nC |

Notes:

1. Pulse width limited by Max. junction temperature.
2. Pulse test
3. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 10\text{sec}$; $135^\circ\text{C}/W$ when mounted on min. copper pad.

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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AP4525GEM-HF

N-Channel

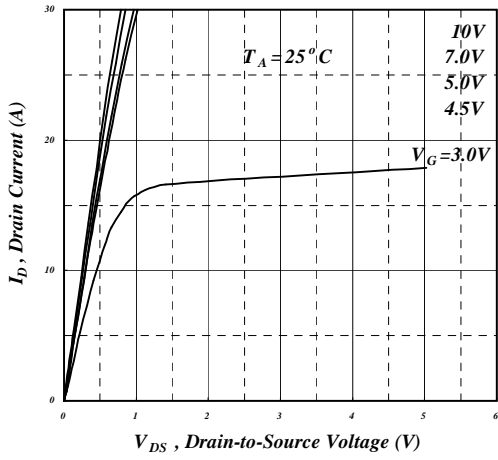


Fig 1. Typical Output Characteristics

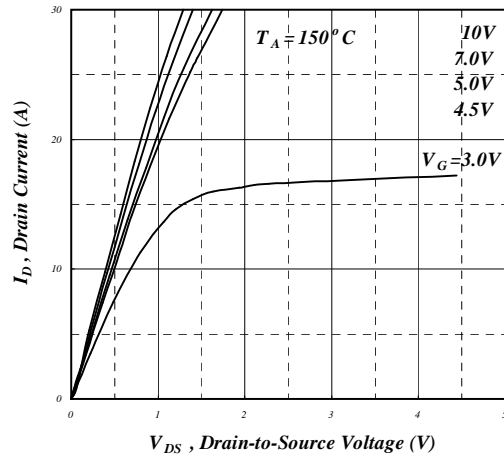


Fig 2. Typical Output Characteristics

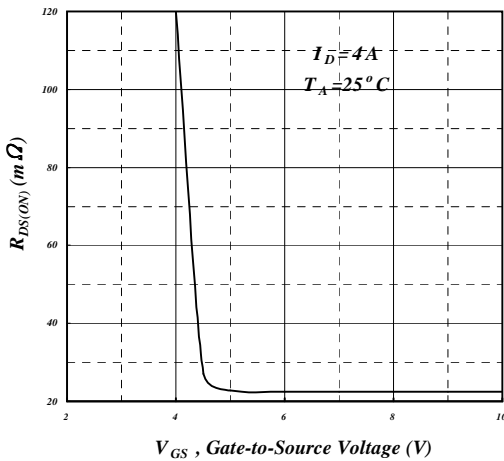


Fig 3. On-Resistance v.s. Gate Voltage

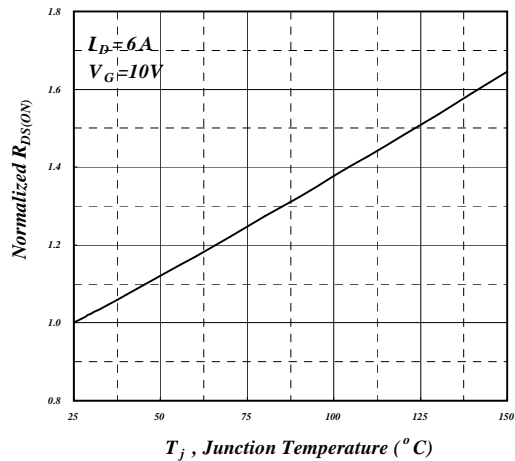


Fig 4. Normalized On-Resistance v.s. Junction Temperature

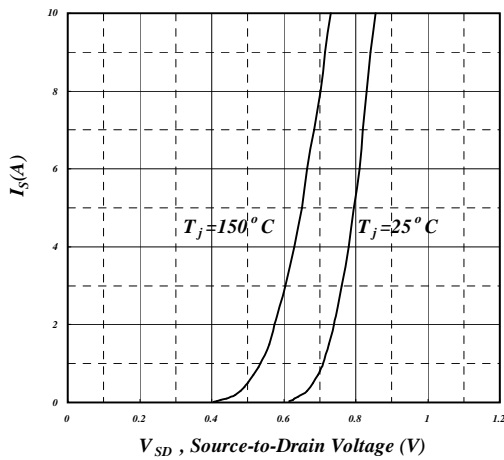


Fig 5. Forward Characteristic of Reverse Diode

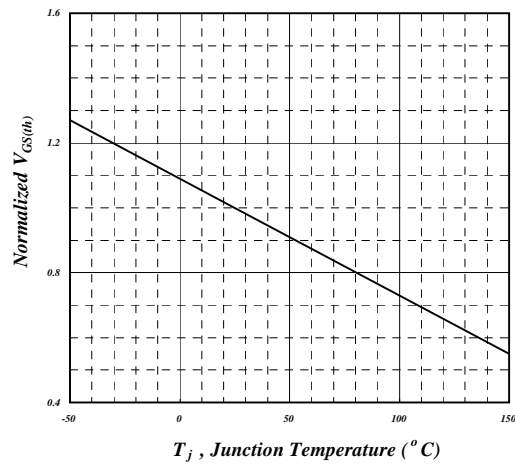


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



N-Channel

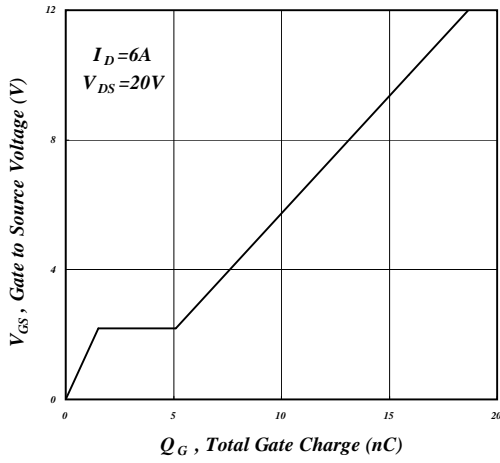


Fig 7. Gate Charge Characteristics

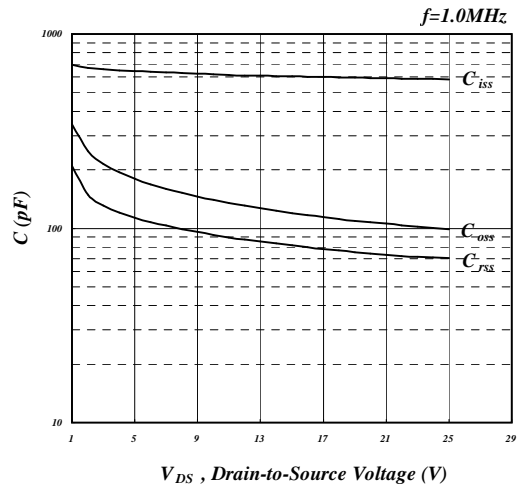


Fig 8. Typical Capacitance Characteristics

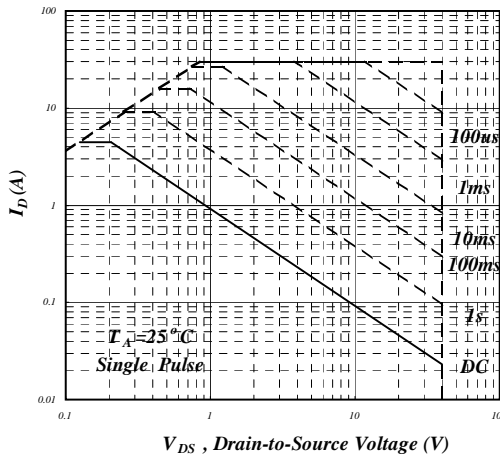


Fig 9. Maximum Safe Operating Area

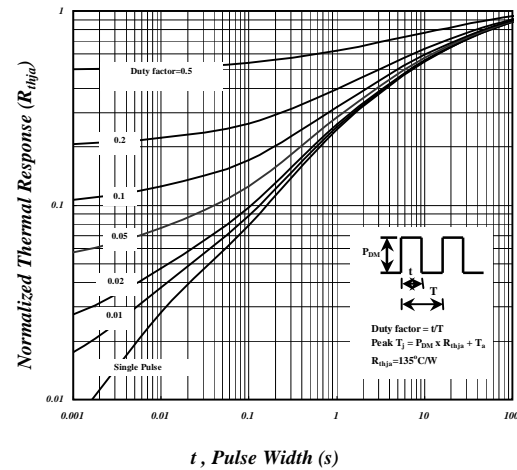


Fig 10. Effective Transient Thermal Impedance

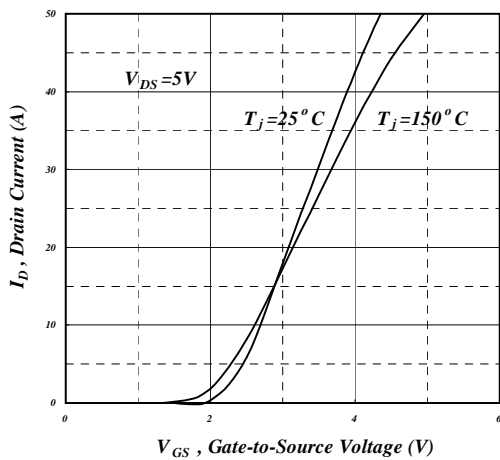


Fig 11. Transfer Characteristics

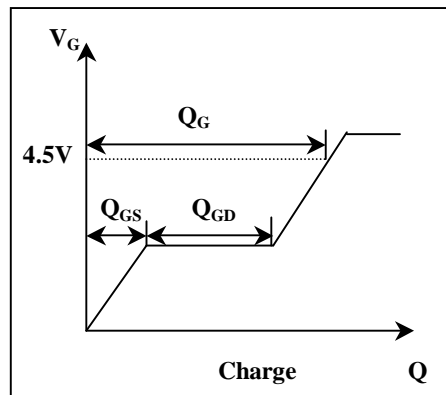


Fig 12. Gate Charge Waveform



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P-Channel

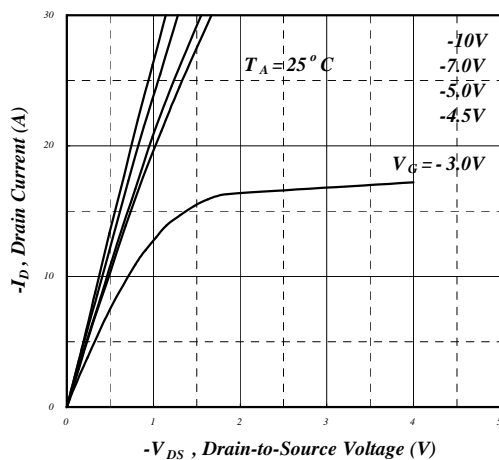


Fig 1. Typical Output Characteristics

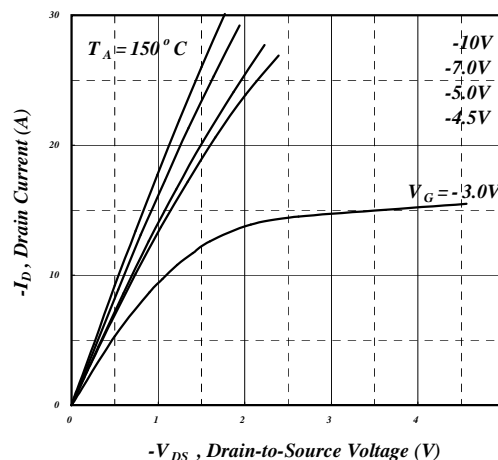


Fig 2. Typical Output Characteristics

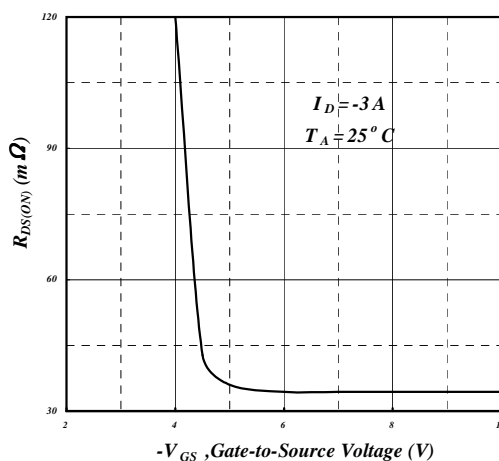


Fig 3. On-Resistance v.s. Gate Voltage

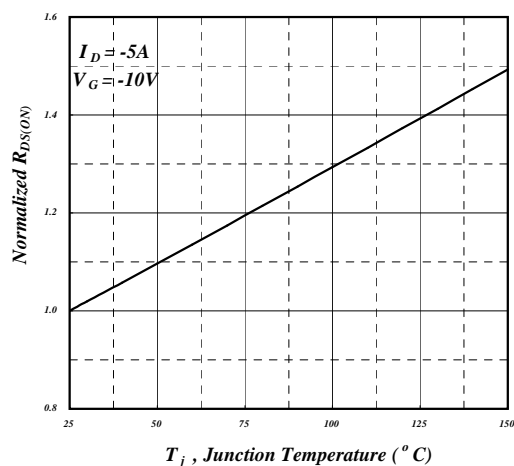


Fig 4. Normalized On-Resistance v.s. Junction Temperature

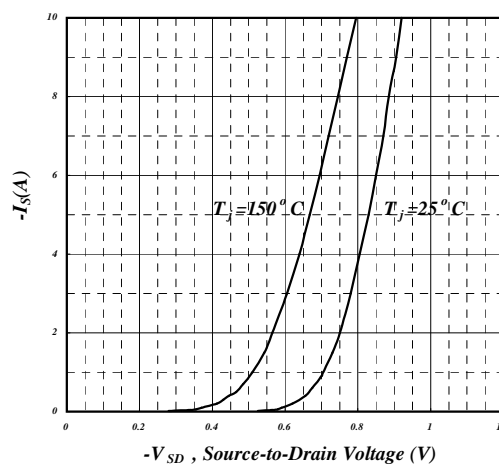


Fig 5. Forward Characteristic of Reverse Diode

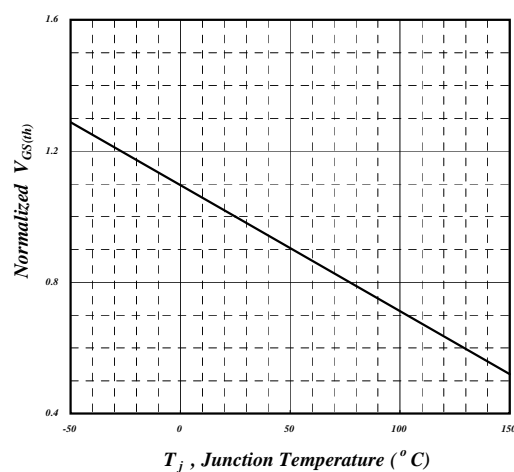


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



P-Channel

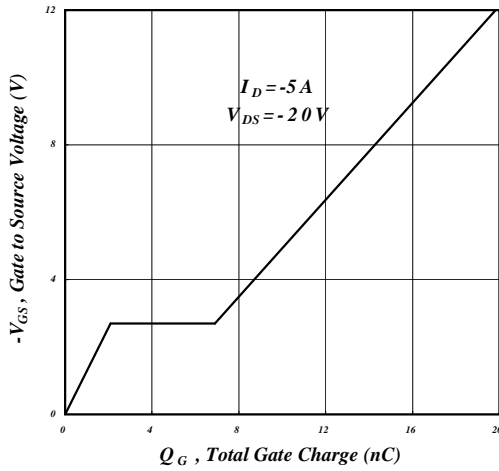


Fig 7. Gate Charge Characteristics

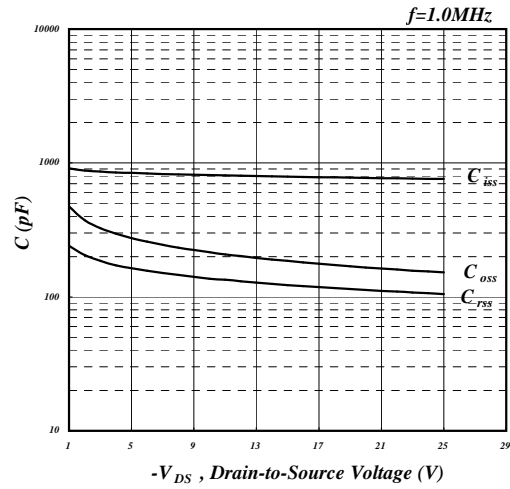


Fig 8. Typical Capacitance Characteristics

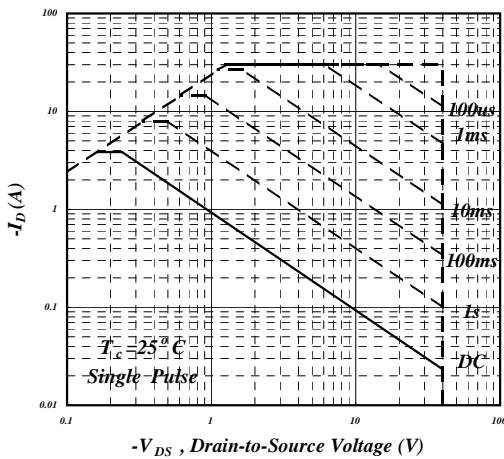


Fig 9. Maximum Safe Operating Area

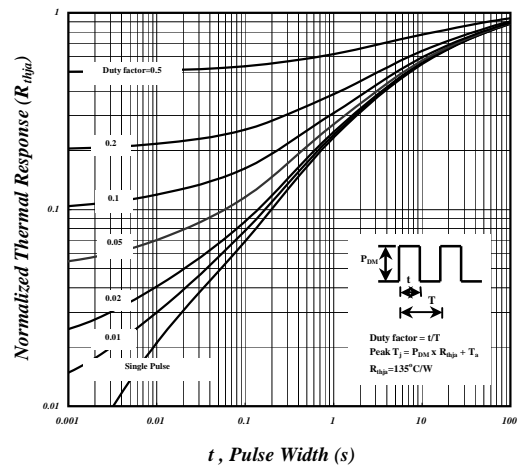


Fig 10. Effective Transient Thermal Impedance

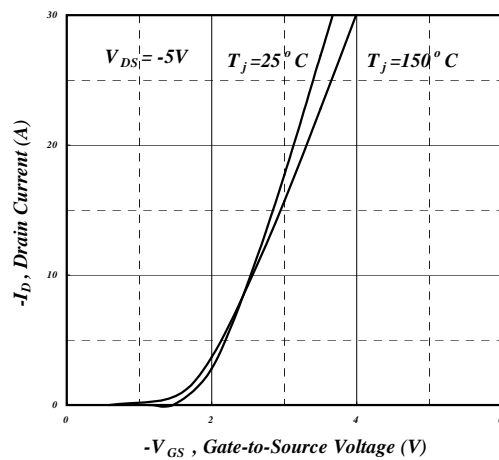


Fig 11. Transfer Characteristics

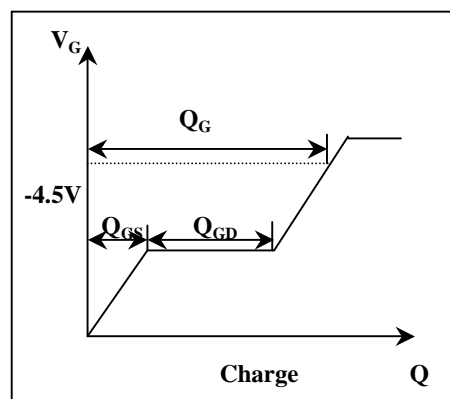


Fig 12. Gate Charge Waveform



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MARKING INFORMATION

