# CES2301

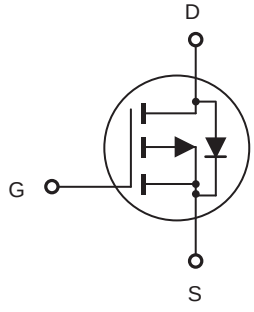
## P-Channel Enhancement Mode Field Effect Transistor

## FEATURES

- -20V, -2.8A, $R_{DS(ON)}$ = 100mΩ @$V_{GS}$ = -4.5V.
  $R_{DS(ON)}$ = 150mΩ @$V_{GS}$ = -2.5V.
- High dense cell design for extremely low $R_{DS(ON)}$.
- Rugged and reliable.
- Lead free product is acquired.
- SOT-23 package.



SOT-23




## ABSOLUTE MAXIMUM RATINGS $T_A$ = 25°C unless otherwise noted

| Parameter | Symbol | Limit | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±8 | V |
| Drain Current-Continuous | $I_D$ | -2.8 | A |
| Drain Current-Pulsed [a] | $I_{DM}$ | -10 | A |
| Maximum Power Dissipation | $P_D$ | 1.25 | W |
| Operating and Store Temperature Range | $T_J$,$T_{stg}$ | -55 to 150 | °C |

## Thermal Characteristics

| Parameter | Symbol | Limit | Units |
|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient [b] | $R_{\theta JA}$ | 100 | °C/W |

## Electrical Characteristics $T_A$ = 25°C unless otherwise noted

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = -250μA | -20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = -20V, $V_{GS}$ = 0V | | | -1 | μA |
| Gate Body Leakage Current, Forward | $I_{GSSF}$ | $V_{GS}$ = 8V, $V_{DS}$ = 0V | | | 100 | nA |
| Gate Body Leakage Current, Reverse | $I_{GSSR}$ | $V_{GS}$ = -8V, $V_{DS}$ = 0V | | | -100 | nA |
| **On Characteristics** [c] | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = -250μA | -0.45 | | | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = -4.5V, $I_D$ = -2.8A | | 80 | 100 | mΩ |
| | | $V_{GS}$ = -2.5V, $I_D$ = -2.0A | | 110 | 150 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = -5V, $I_D$ = -2.8A | | 8 | | S |
| **Dynamic Characteristics** [d] | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = -6V, $V_{GS}$ = 0V, f = 1.0 MHz | | 880 | | pF |
| Output Capacitance | $C_{oss}$ | | | 270 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 175 | | pF |
| **Switching Characteristics** [d] | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = -6V, $I_D$ = -1A, $V_{GS}$ = -4.5V, $R_{GEN}$ = 6Ω | | 11 | 20 | ns |
| Turn-On Rise Time | $t_r$ | | | 5 | 10 | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 32 | 65 | ns |
| Turn-Off Fall Time | $t_f$ | | | 23 | 45 | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = -6V, $I_D$ = -2.8A, $V_{GS}$ = -4.5V | | 11 | 14.5 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.5 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 2.1 | | nC |
| **Drain-Source Diode Characteristics and Maximun Ratings** | | | | | | |
| Drain-Source Diode Forward Current [b] | $I_S$ | | | | -0.75 | A |
| Drain-Source Diode Forward Voltage [c] | $V_{SD}$ | $V_{GS}$ = 0V, $I_S$ = -0.75A | | | -1.2 | V |

**Notes :**
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Surface Mounted on FR4 Board, t < 5 sec.
c.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
d.Guaranteed by design, not subject to production testing.

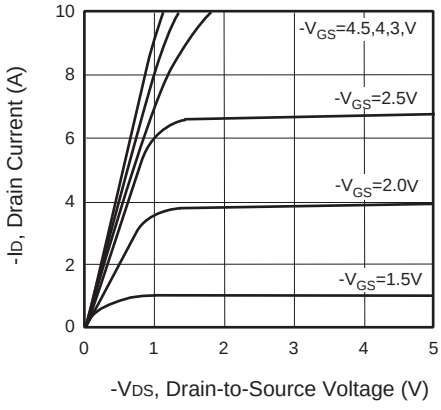



**Figure 1. Output Characteristics**

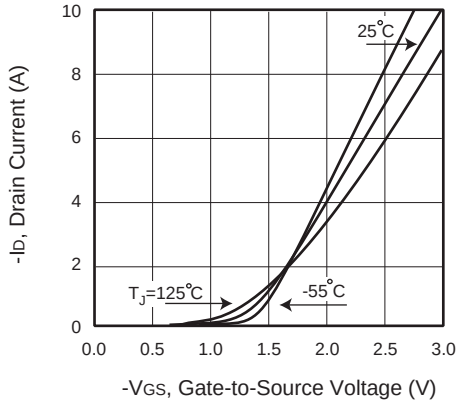



**Figure 2. Transfer Characteristics**

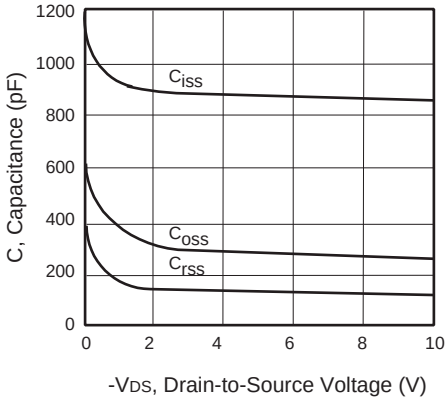



**Figure 3. Capacitance**

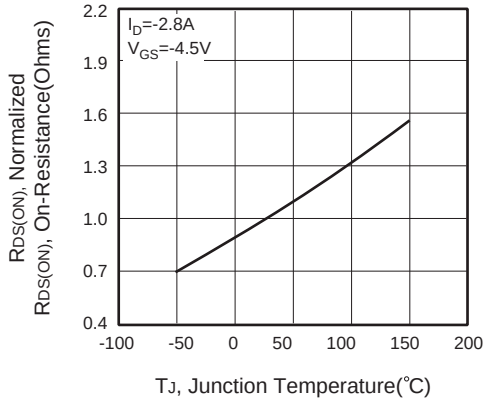



**Figure 4. On-Resistance Variation with Temperature**

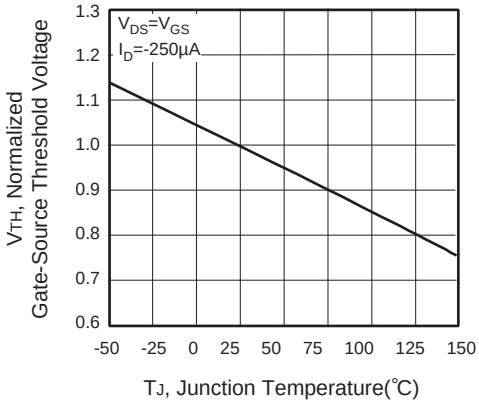



**Figure 5. Gate Threshold Variation with Temperature**

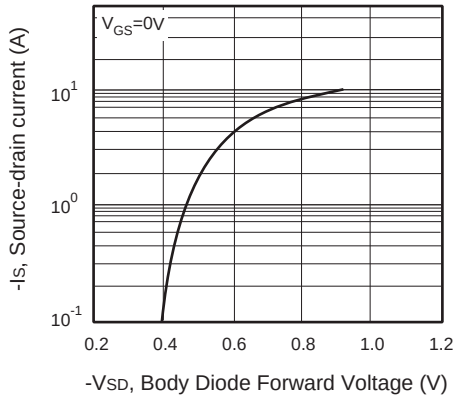



**Figure 6. Body Diode Forward Voltage Variation with Source Current**

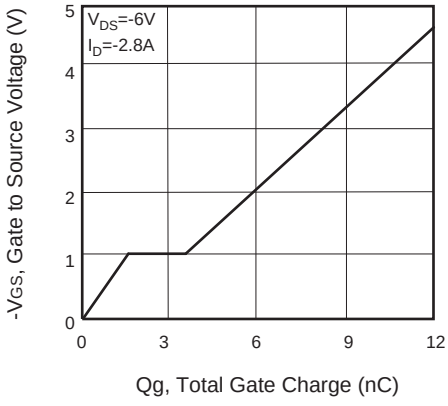



**Figure 7. Gate Charge**

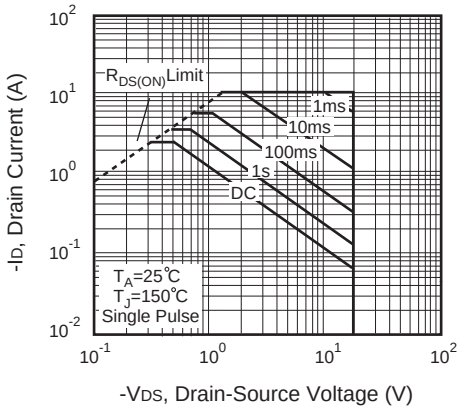



**Figure 8. Maximum Safe Operating Area**

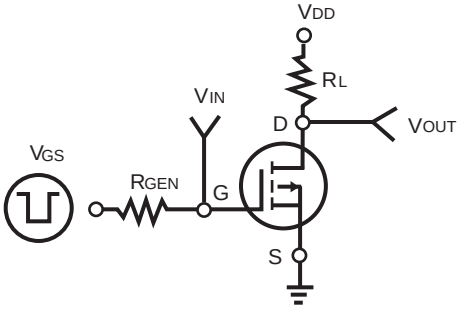



**Figure 9. Switching Test Circuit**

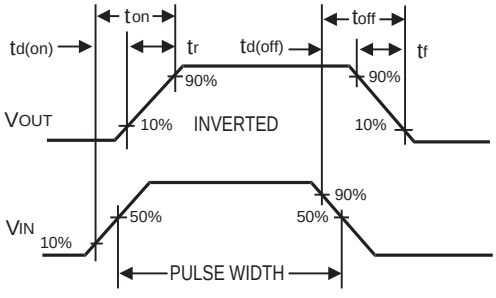



**Figure 10. Switching Waveforms**

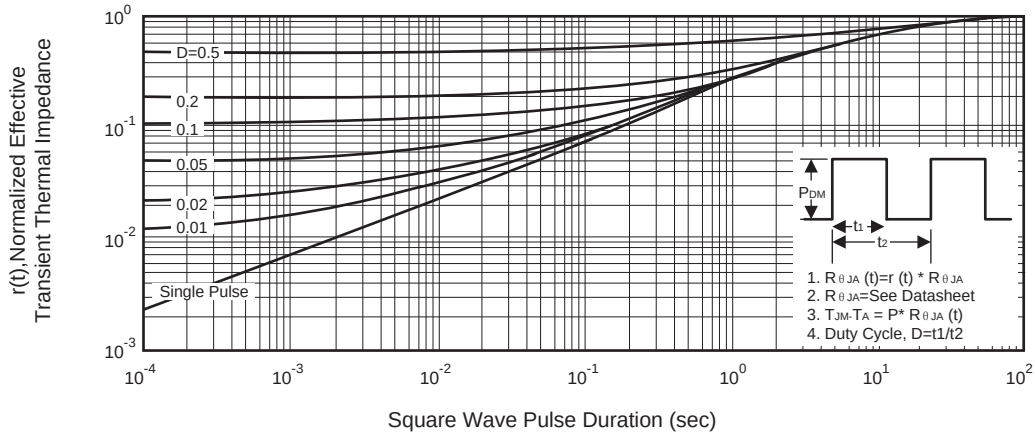



**Figure 11. Normalized Thermal Transient Impedance Curve**