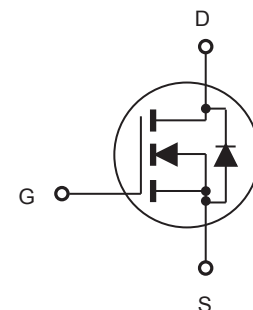
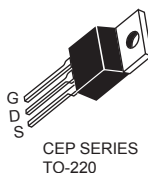
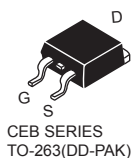


### FEATURES

- 60V, 72A,  $R_{DS(ON)} = 10m\Omega$  @  $V_{GS} = 10V$ .  
 $R_{DS(ON)} = 13.5m\Omega$  @  $V_{GS} = 4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- Lead-free plating ; RoHS compliant.
- TO-220 & TO-263 package.



### ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise notedz

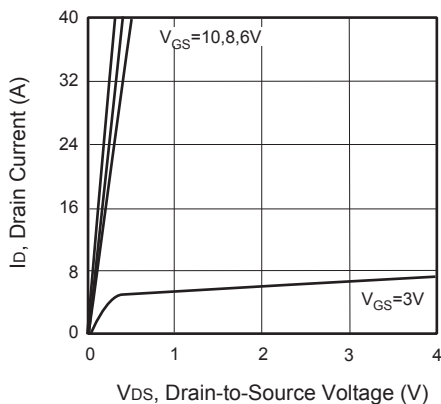
| Parameter                                                                                 | Symbol         | Limit      | Units               |
|-------------------------------------------------------------------------------------------|----------------|------------|---------------------|
| Drain-Source Voltage                                                                      | $V_{DS}$       | 60         | V                   |
| Gate-Source Voltage                                                                       | $V_{GS}$       | $\pm 20$   | V                   |
| Drain Current-Continuous @ $T_C = 25^\circ\text{C}$<br>@ $T_C = 100^\circ\text{C}$        | $I_D$          | 72         | A                   |
|                                                                                           |                | 51         | A                   |
| Drain Current-Pulsed <sup>a</sup>                                                         | $I_{DM}$       | 288        | A                   |
| Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$<br>- Derate above $25^\circ\text{C}$ | $P_D$          | 75         | W                   |
|                                                                                           |                | 0.5        | W/ $^\circ\text{C}$ |
| Single Pulsed Avalanche Energy <sup>d</sup>                                               | $E_{AS}$       | 132        | mJ                  |
| Single Pulsed Avalanche Current <sup>d</sup>                                              | $I_{AS}$       | 23         | A                   |
| Operating and Store Temperature Range                                                     | $T_J, T_{stg}$ | -55 to 175 | $^\circ\text{C}$    |

### Thermal Characteristics

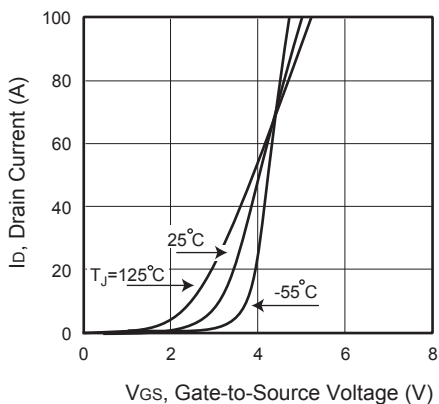
| Parameter                               | Symbol          | Limit | Units              |
|-----------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 2     | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5  | $^\circ\text{C/W}$ |

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

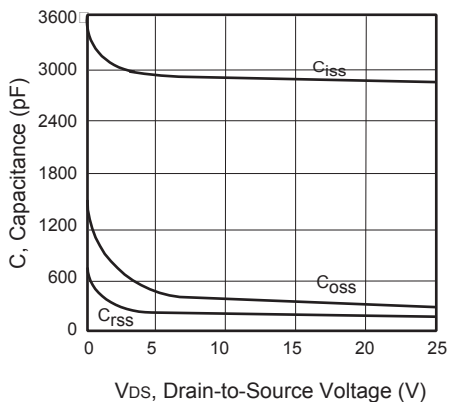
| Parameter                                                                                                                                                                                                                                                                         | Symbol       | Test Condition                                                    | Min | Typ  | Max  | Units      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------|-----|------|------|------------|
| Off Characteristics                                                                                                                                                                                                                                                               |              |                                                                   |     |      |      |            |
| Drain-Source Breakdown Voltage                                                                                                                                                                                                                                                    | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                     | 60  |      |      | V          |
| Zero Gate Voltage Drain Current                                                                                                                                                                                                                                                   | $I_{DSS}$    | $V_{DS} = 60V, V_{GS} = 0V$                                       |     |      | 1    | $\mu A$    |
| Gate Body Leakage Current, Forward                                                                                                                                                                                                                                                | $I_{GSSF}$   | $V_{GS} = 20V, V_{DS} = 0V$                                       |     |      | 100  | nA         |
| Gate Body Leakage Current, Reverse                                                                                                                                                                                                                                                | $I_{GSSR}$   | $V_{GS} = -20V, V_{DS} = 0V$                                      |     |      | -100 | nA         |
| On Characteristics <sup>b</sup>                                                                                                                                                                                                                                                   |              |                                                                   |     |      |      |            |
| Gate Threshold Voltage                                                                                                                                                                                                                                                            | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                                 | 1   |      | 3    | V          |
| Static Drain-Source                                                                                                                                                                                                                                                               | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 20A$                                         |     | 8    | 10   | m $\Omega$ |
| On-Resistance                                                                                                                                                                                                                                                                     |              | $V_{GS} = 4.5V, I_D = 10A$                                        |     | 10   | 13.5 | m $\Omega$ |
| Dynamic Characteristics <sup>c</sup>                                                                                                                                                                                                                                              |              |                                                                   |     |      |      |            |
| Input Capacitance                                                                                                                                                                                                                                                                 | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V,$<br>$f = 1.0\text{ MHz}$              |     | 2815 |      | pF         |
| Output Capacitance                                                                                                                                                                                                                                                                | $C_{oss}$    |                                                                   |     | 235  |      | pF         |
| Reverse Transfer Capacitance                                                                                                                                                                                                                                                      | $C_{rss}$    |                                                                   |     | 165  |      | pF         |
| Switching Characteristics <sup>c</sup>                                                                                                                                                                                                                                            |              |                                                                   |     |      |      |            |
| Turn-On Delay Time                                                                                                                                                                                                                                                                | $t_{d(on)}$  | $V_{DD} = 30V, I_D = 20A,$<br>$V_{GS} = 10V, R_{GEN} = 4.7\Omega$ |     | 19   | 38   | ns         |
| Turn-On Rise Time                                                                                                                                                                                                                                                                 | $t_r$        |                                                                   |     | 10   | 20   | ns         |
| Turn-Off Delay Time                                                                                                                                                                                                                                                               | $t_{d(off)}$ |                                                                   |     | 75   | 150  | ns         |
| Turn-Off Fall Time                                                                                                                                                                                                                                                                | $t_f$        |                                                                   |     | 12   | 24   | ns         |
| Total Gate Charge                                                                                                                                                                                                                                                                 | $Q_g$        | $V_{DS} = 48V, I_D = 20A,$<br>$V_{GS} = 4.5V$                     |     | 32   | 42   | nC         |
| Gate-Source Charge                                                                                                                                                                                                                                                                | $Q_{gs}$     |                                                                   |     | 7    |      | nC         |
| Gate-Drain Charge                                                                                                                                                                                                                                                                 | $Q_{gd}$     |                                                                   |     | 18   |      | nC         |
| Drain-Source Diode Characteristics and Maximun Ratings                                                                                                                                                                                                                            |              |                                                                   |     |      |      |            |
| Drain-Source Diode Forward Current                                                                                                                                                                                                                                                | $I_S$        |                                                                   |     |      | 62.5 | A          |
| Drain-Source Diode Forward Voltage <sup>b</sup>                                                                                                                                                                                                                                   | $V_{SD}$     | $V_{GS} = 0V, I_S = 20A$                                          |     |      | 1.2  | V          |
| Notes :□<br>a.Repetitive Rating : Pulse width limited by maximum junction temperature.□<br>b.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.□<br>c.Guaranteed by design, not subject to production testing.□<br>d.L = 0.5mH, IAS =23A, VDD = 24V, RG = 25Ω, Starting TJ = 25 C |              |                                                                   |     |      |      |            |



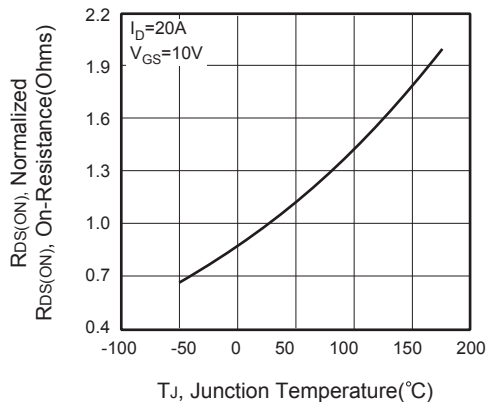
**Figure 1. Output Characteristics**



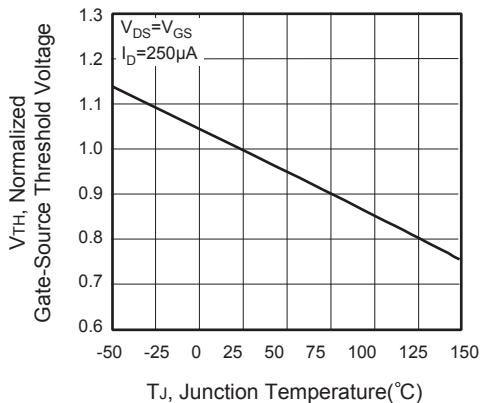
**Figure 2. Transfer Characteristics**



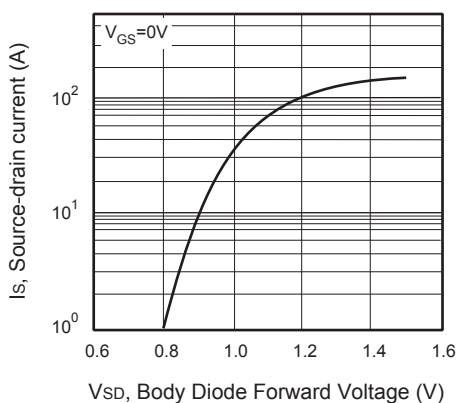
**Figure 3. Capacitance**



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



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



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

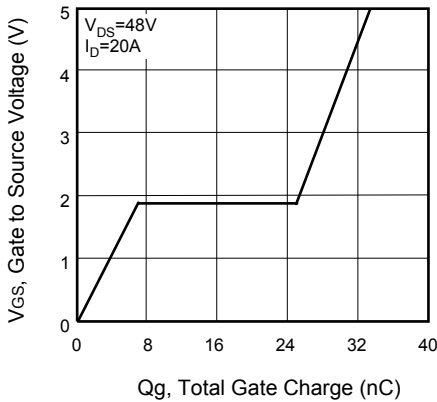


Figure 7. Gate Charge

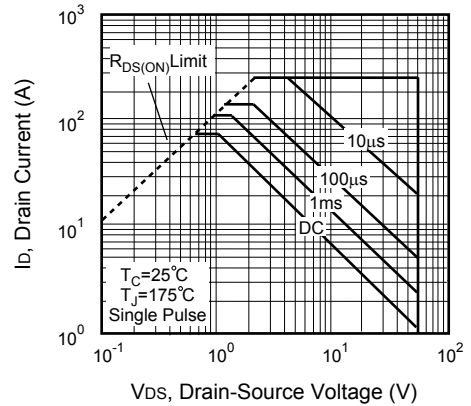


Figure 8. Maximum Safe Operating Area

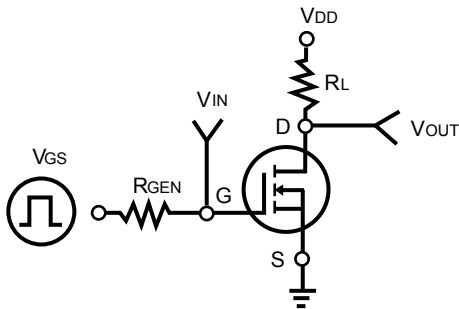


Figure 9. Switching Test Circuit

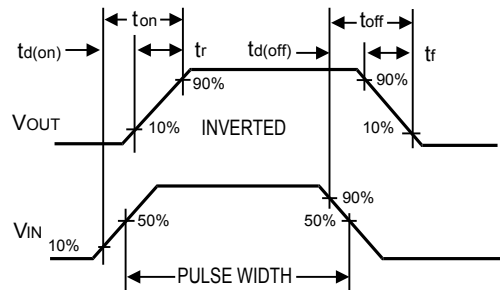


Figure 10. Switching Waveforms

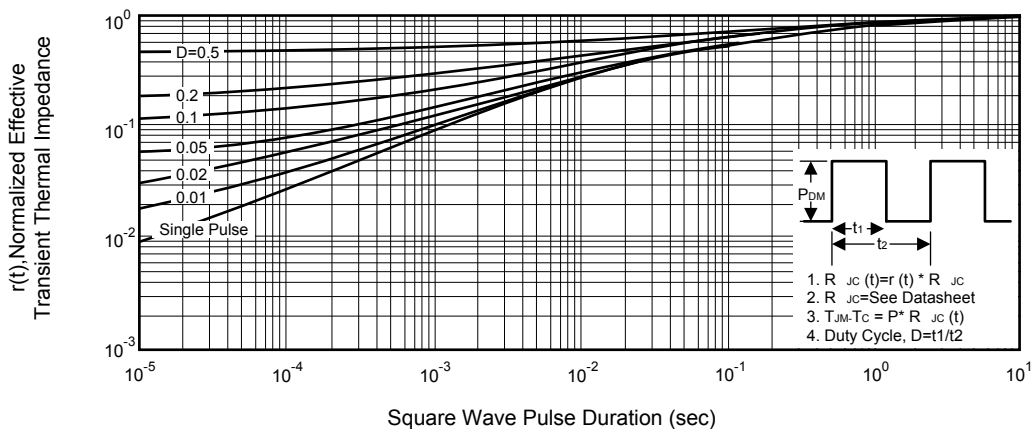


Figure 11. Normalized Thermal Transient Impedance Curve