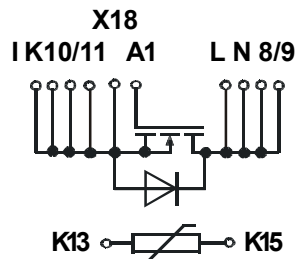


Power MOSFET in ECO-PAC 2

Single MOSFET Die

PSMG 150/01*



$V_{DSS} = 100\text{ V}$
 $I_{D25} = 165\text{ A}$
 $R_{DS(on)} = 8\text{ m}\Omega$
 $t_{rr} < 250\text{ ns}$

Preliminary Data Sheet

*NTC optional

MOSFET

| Symbol | Test Conditions | Maximum Ratings | |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 100 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1\text{ M}\Omega$ | 100 | V |
| V_{GS} | Continuous | ± 20 | V |
| V_{GSM} | Transient | ± 30 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ (MOSFET chip capability) | 165 | A |
| $I_{D(RMS)}$ | External lead (current limit) | 76 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$ ¹⁾ | 720 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 180 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 60 | mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 3 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$ $T_J \leq 150^\circ\text{C}$, $R_G = 2\ \Omega$ | 5 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 400 | W |



Features

- Silicon chip on Direct-Copper-Bond substrate
- High power dissipation
- Isolated mounting surface
- 3000V electrical isolation
- Low drain to tab capacitance (< 25pF)
- Low $R_{DS(on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic Rectifier
- UL certified, E 148688

Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control

Advantages

- Easy assembly
- Space savings
- High power density

Caution: These Devices are sensitive to electrostatic discharge. Users should observe proper ESD handling precautions.

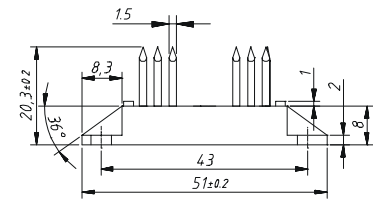
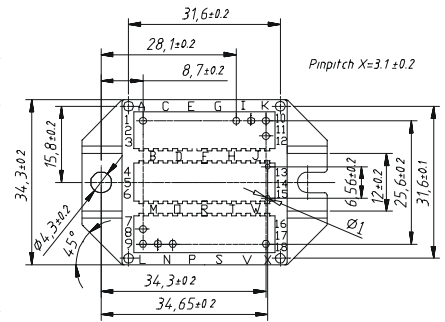
| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------|
| | | min. | typ. | max. |
| V_{DSS} | $V_{GS} = 0\text{ V}$, $I_D = 3\text{ mA}$ | 100 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 8\text{ mA}$ | 2.0 | | V |
| I_{GSS} | $V_{GS} = \pm 20\text{ V}$, $V_{DS} = 0$ | | | ± 100 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$; $T_J = 25^\circ\text{C}$ $V_{GS} = 0\text{ V}$; $T_J = 125^\circ\text{C}$ | | | 100 μA 2 mA |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$, $I_D = 90\text{ A}$ ¹⁾ | | | 8 m Ω |
| g_{fs} | $V_{DS} = 10\text{ V}$; $I_D = 90\text{ A}$ ²⁾ | 60 | 90 | S |
| C_{iss} C_{oss} C_{rss} | } $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | | 9400 | pF |
| | | | 3200 | pF |
| | | | 1660 | pF |
| $t_{d(on)}$ t_r $t_{d(off)}$ t_f | } $V_{GS} = 10\text{ V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 90\text{ A}$ $R_G = 1\ \Omega$ (External) | | 50 | ns |
| | | | 90 | ns |
| | | | 140 | ns |
| | | | 65 | ns |
| $Q_{g(on)}$ Q_{gs} Q_{gd} | } $V_{GS} = 10\text{ V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 90\text{ A}$ | | 400 | nC |
| | | | 65 | nC |
| | | | 220 | nC |
| R_{thJC} R_{thCK} | with heatsink compound (0.42 K/m.K; 50 μm) | 0.2 | 0.30 | K/W K/W |

Source-Drain Diode

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|----------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| | | min. | typ. | max. |
| I_S | $V_{GS} = 0\text{ V}$ | | | 180 A |
| I_{SM} | Repetitive; pulse width limited by T_{JM} | | | 720 A |
| V_{SD} | $I_F = 100\text{ A}$, $V_{GS} = 0\text{ V}$, ¹⁾ | | | 1.5 V |
| t_{rr} | $I_F = 50\text{ A}$, $-di/dt = 100\text{ A}/\mu\text{s}$, $V_R = 100\text{ V}$ | | | 250 ns |
| Q_{RM} | | 1.1 | | μC |
| I_{RM} | | 13 | | A |

Note: ¹⁾ Pulse width limited by T_{JM}
²⁾ Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$

Package style and outline Dimensions in mm (1mm = 0.0394")



Temperature Sensor NTC

| Symbol | Conditions | Characteristic Values | | |
|-------------|------------------------|-----------------------|------|-----------------|
| | | min. | typ. | max. |
| R_{25} | $T = 25^\circ\text{C}$ | 4.75 | 5.0 | 5.25 k Ω |
| $B_{25/50}$ | | | 3375 | K |

Module

| Symbol | Conditions | Maximum Ratings | |
|------------|----------------------------------------------------------|-----------------|------------------|
| T_{VJ} | | -40...+150 | $^\circ\text{C}$ |
| T_{stg} | | -40...+125 | $^\circ\text{C}$ |
| V_{ISOL} | $I_{ISOL} \leq 1\text{ mA}$; 50/60 Hz; $t = 1\text{ s}$ | 3600 | V~ |
| M_d | Mounting torque (M4) | 1.5 - 2.0 | Nm |
| | | 14 - 18 | lb.in. |
| a | Max. allowable acceleration | 50 | m/s^2 |

| Symbol | Conditions | Characteristic Values | | |
|--------|------------------------------------------------|-----------------------|------|------|
| | | min. | typ. | max. |
| d_s | Creepage distance on surface (Pin to heatsink) | 11.2 | | mm |
| d_A | Strike distance in air (Pin to heatsink) | 11.2 | | mm |
| Weight | | 24 | | g |

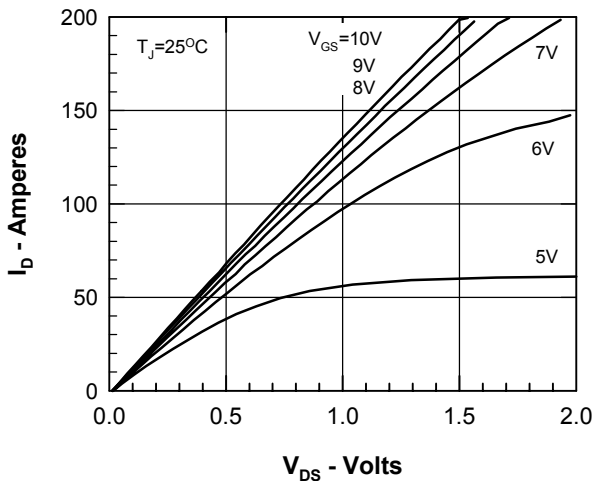


Figure 1. Output Characteristics at 25°C

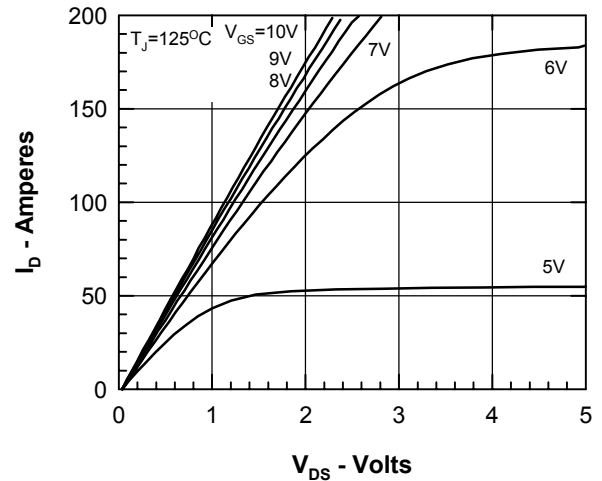


Figure 2. Output Characteristics at 125°C

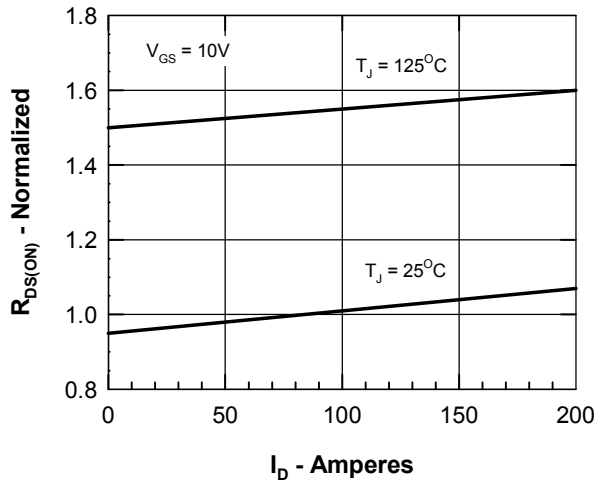


Figure 3. $R_{DS(on)}$ normalized to 15A/25°C vs. I_D

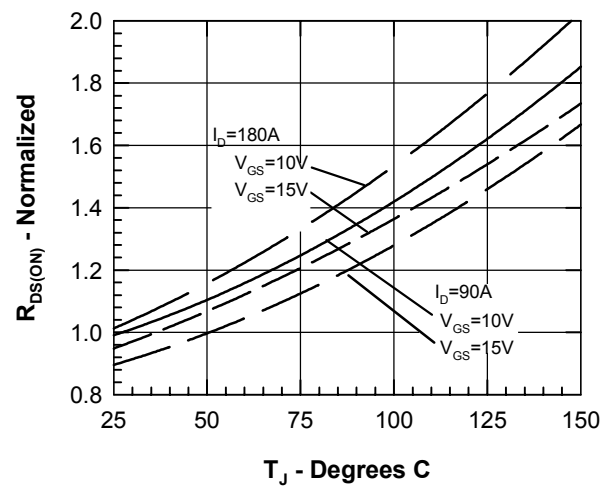


Figure 4. $R_{DS(on)}$ normalized to 15A/25°C vs. T_J

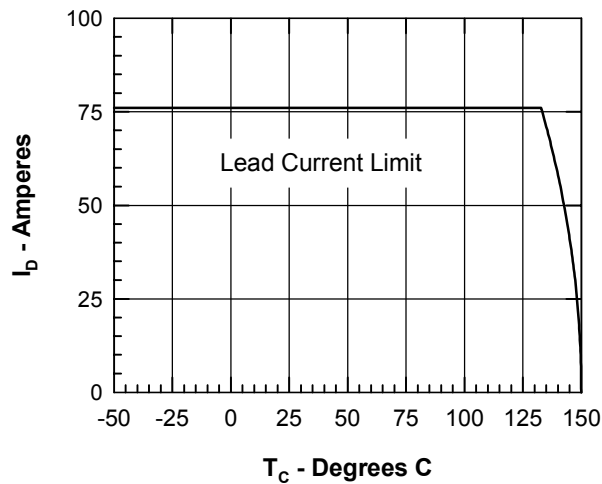


Figure 5. Drain Current vs. Case Temperature

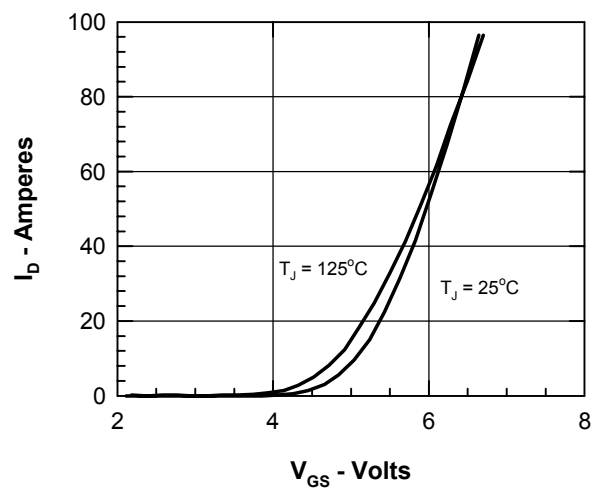


Figure 6. Admittance Curves

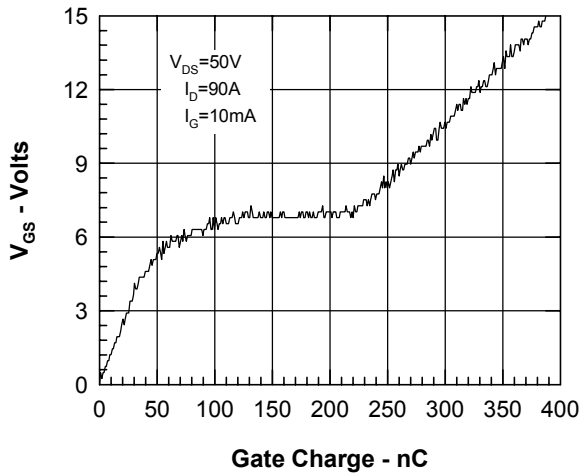


Figure 7. Gate Charge

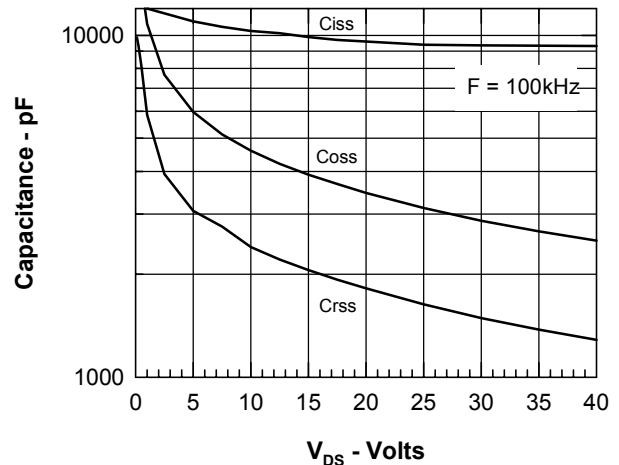


Figure 8. Capacitance Curves

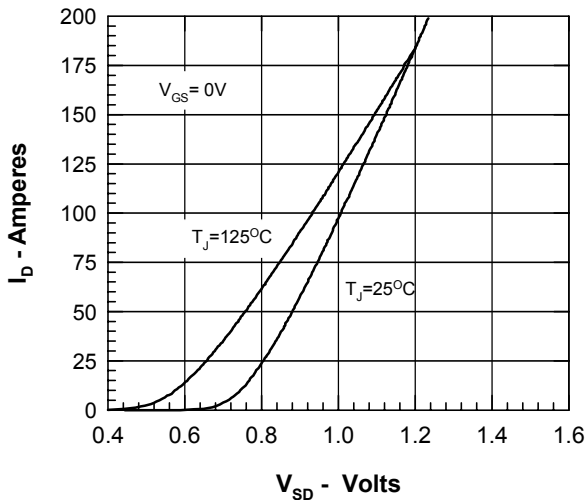


Figure 9. Forward Voltage Drop of the Intrinsic Diode

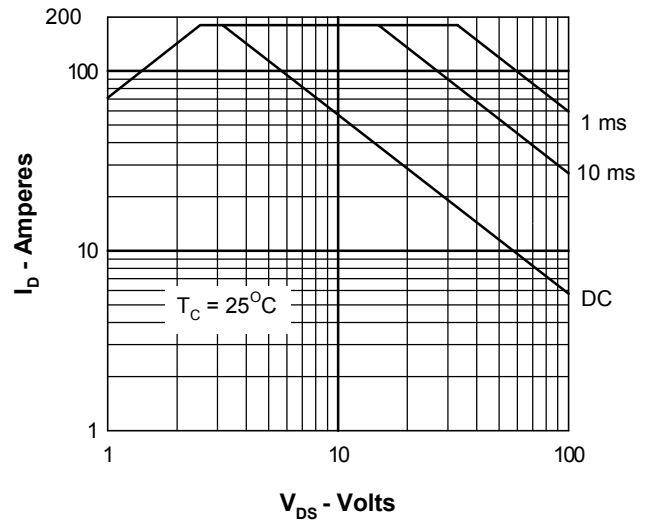


Figure 10. Forward Bias Safe Operating Area

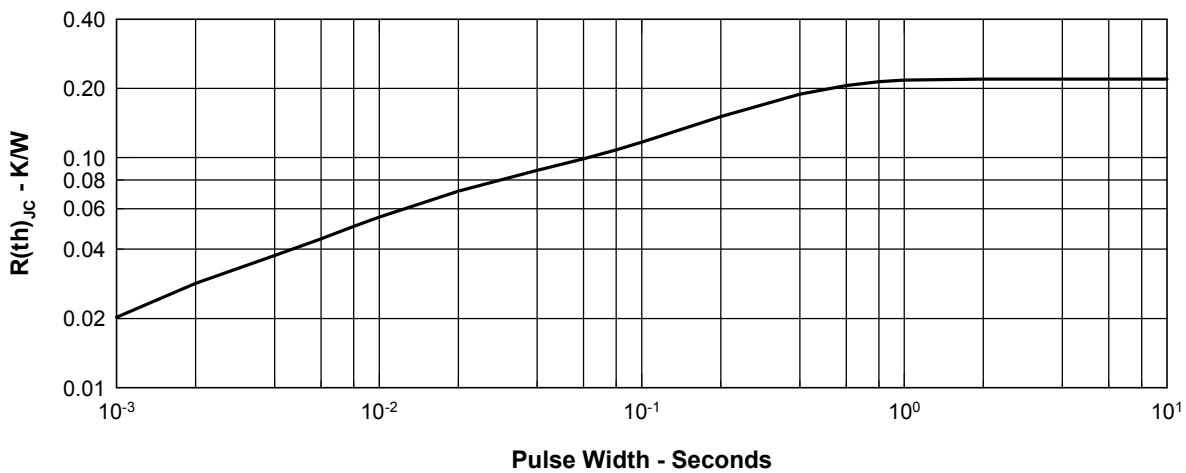


Figure 11. Typical Transient Thermal Resistance