

General Description

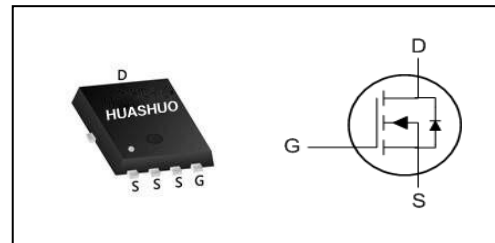
- 100% UIS Tested
- Advanced Trench Technology
- Low Gate Charge
- High Current Capability
- RoHS and Halogen-Free Compliant

Applications

- SMPS Synchronous Rectification
- DC/DC Converters
- Or-ing

Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | 40 | V |
| $R_{DS(ON),TYP}$ | 0.8 | m Ω |
| I_D | 230 | A |

PRPAK5X6 Pin Configuration

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | 40 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 230 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 140 | A |
| I_{DM} | Pulsed Drain Current ² | 490 | A |
| EAS | Single Pulse Avalanche Energy ³ | 580 | mJ |
| I_{AS} | Avalanche Current | 110 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 90 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | --- | 63 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 1.4 | $^\circ C/W$ |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|--|--|------|------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 40 | --- | --- | V |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =20A | --- | 0.8 | 1.2 | mΩ |
| | | V _{GS} =4.5V, I _D =20A | --- | 1.2 | 2.0 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.2 | 1.7 | 2.2 | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =32V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =32V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 1.3 | --- | Ω |
| Q _g | Total Gate Charge (10V) | V _{DS} =20V, V _{GS} =10V, I _D =20A | --- | 128 | --- | nC |
| Q _g | Total Gate Charge (4.5V) | | --- | 67 | --- | |
| Q _{gs} | Gate-Source Charge | | --- | 17 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 29 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =20V, V _{GS} =10V, R _G =1.5Ω, I _D =20A | --- | 22 | --- | ns |
| T _r | Rise Time | | --- | 149 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 55 | --- | |
| T _f | Fall Time | | --- | 17 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =20V, V _{GS} =0V, f=1MHz | --- | 6810 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 2119 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 222 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current ^{1,6} | V _G =V _D =0V, Force Current | --- | --- | 100 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=106A
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.
- Package limitation current is 100A.

Typical Characteristics

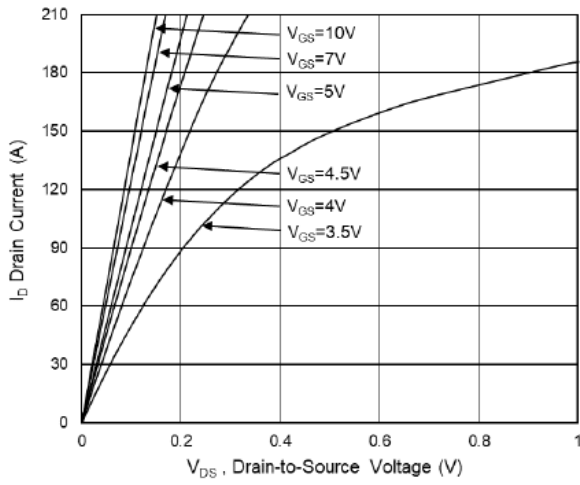


Fig.1 Typical Output Characteristics

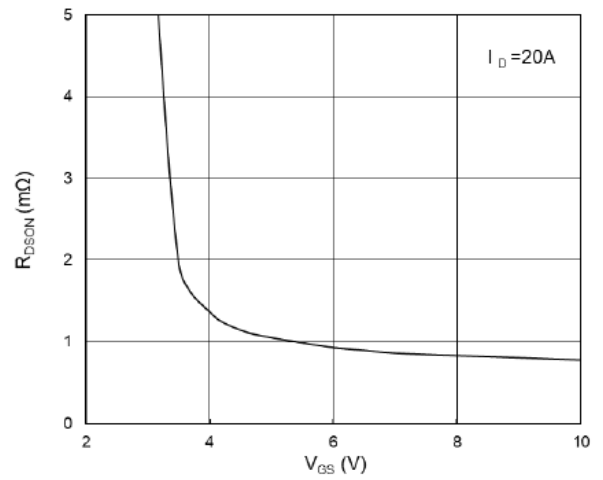


Fig.2 On-Resistance vs G-S Voltage

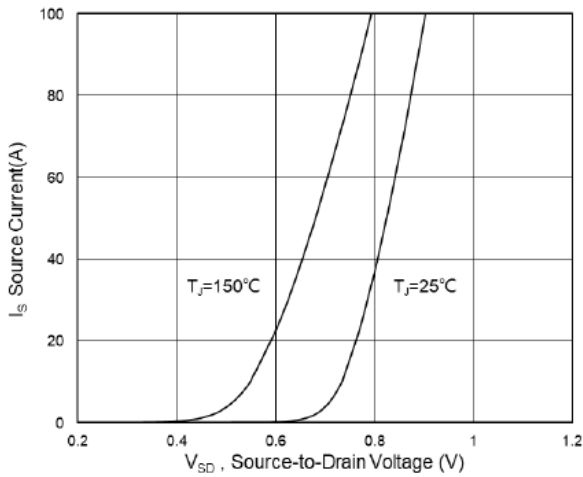


Fig.3 Source Drain Forward Characteristics

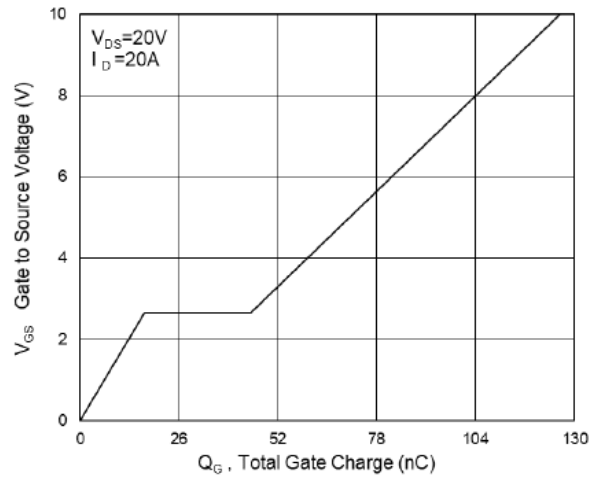


Fig.4 Gate-Charge Characteristics

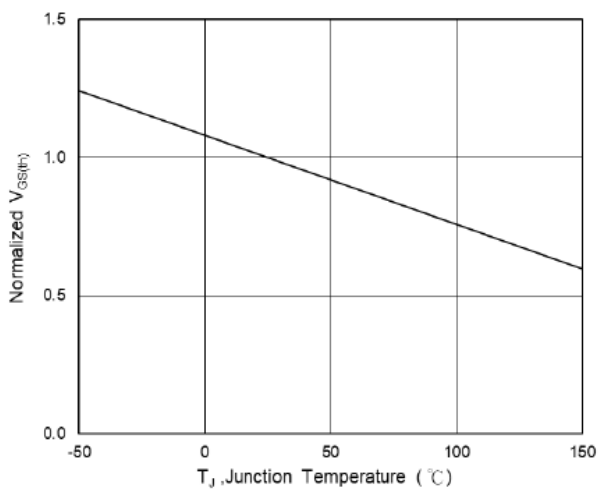


Fig.5 Normalized $V_{GS(th)}$ vs T_J

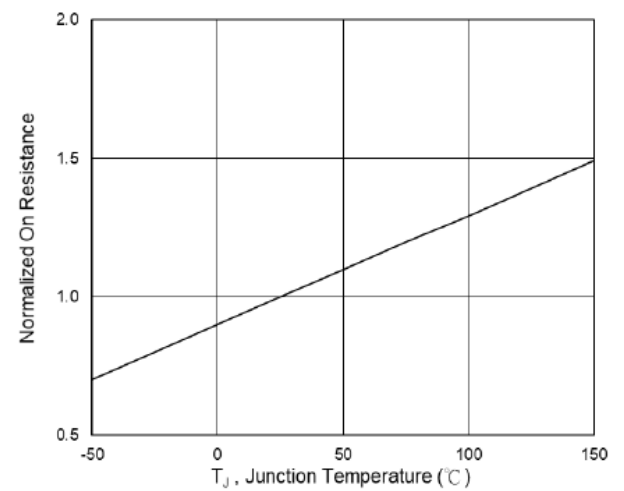


Fig.6 Normalized $R_{DS(on)}$ vs T_J



N-Ch 40V Fast Switching MOSFETs

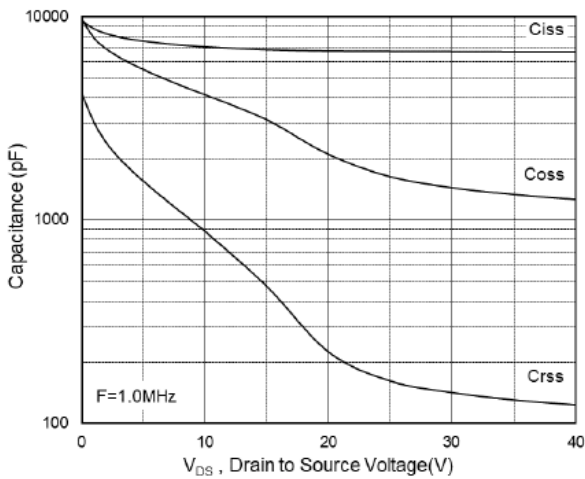


Fig.7 Capacitance

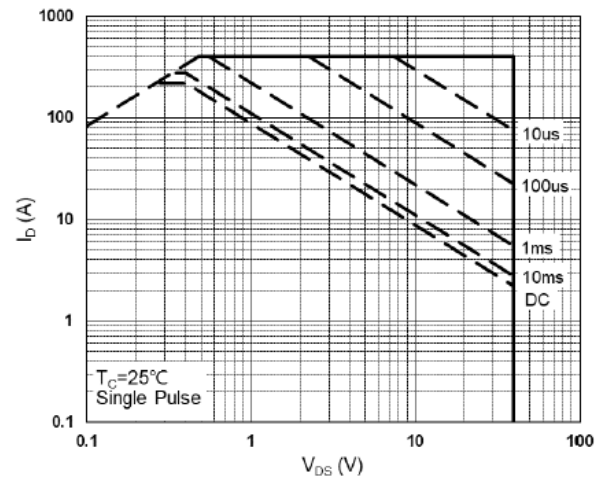


Fig.8 Safe Operating Area

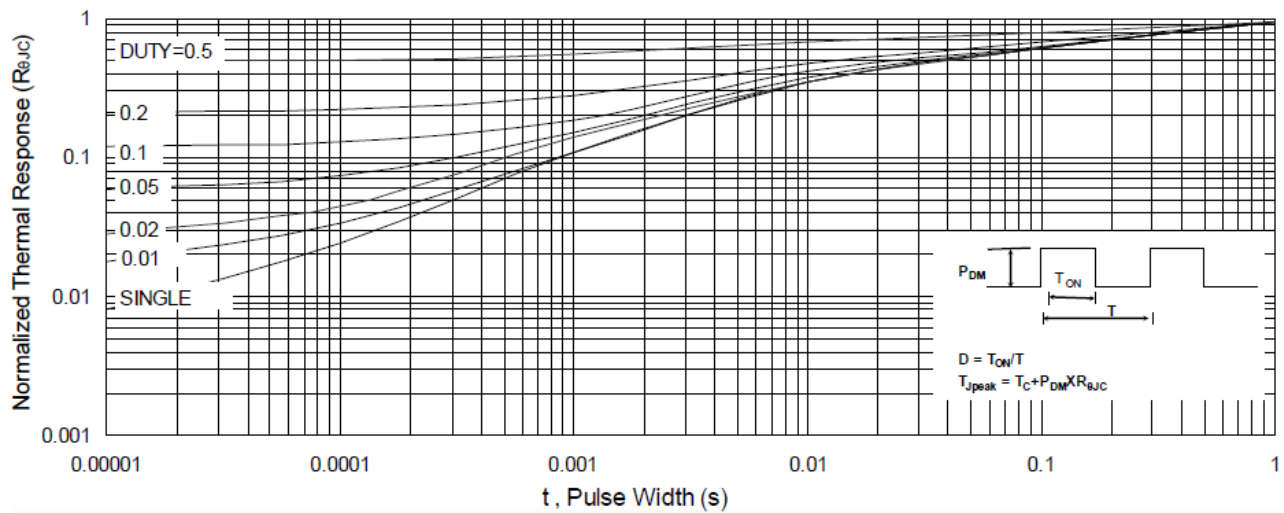


Fig.9 Normalized Maximum Transient Thermal Impedance

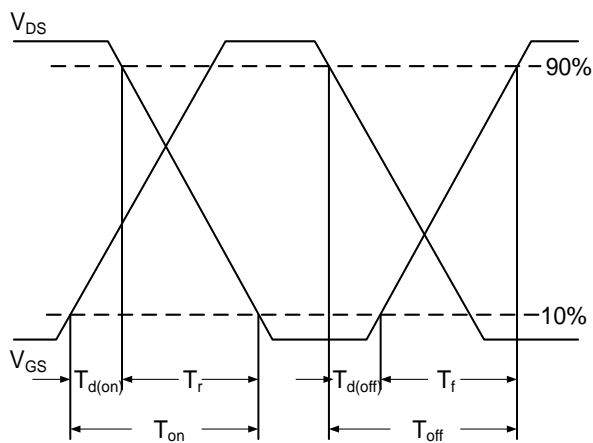


Fig.10 Switching Time Waveform

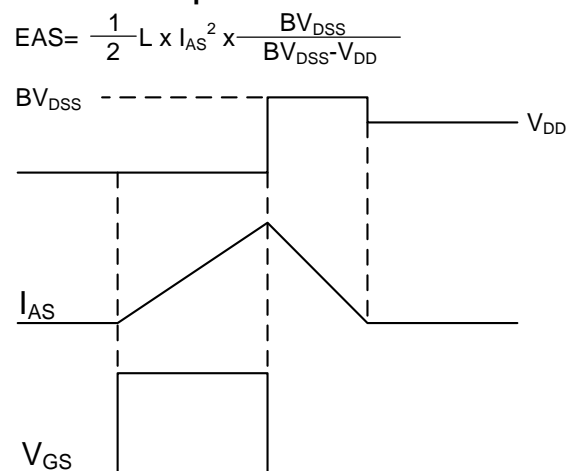
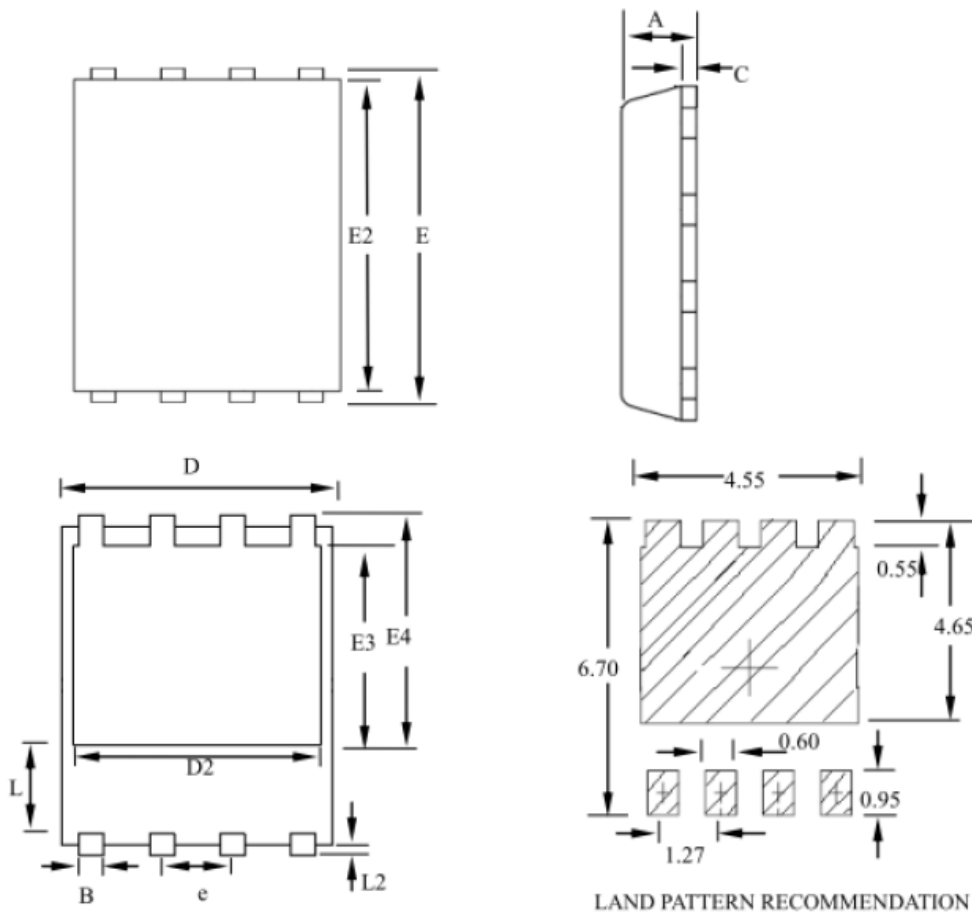


Fig.11 Unclamped Inductive Switching



PRPAK5X6 Package Outline Dimensions



| SYMBOLS | MILLIMETERS | | | INCHES | | |
|---------|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | -- | 1.20 | 0.031 | -- | 0.047 |
| B | 0.30 | -- | 0.51 | 0.012 | -- | 0.020 |
| C | 0.15 | -- | 0.35 | 0.006 | -- | 0.014 |
| D | 4.80 | -- | 5.30 | 0.189 | -- | 0.209 |
| D2 | 3.61 | -- | 4.35 | 0.142 | -- | 0.171 |
| E | 5.90 | -- | 6.35 | 0.232 | -- | 0.250 |
| E2 | 5.42 | -- | 5.90 | 0.213 | -- | 0.232 |
| E3 | 3.23 | -- | 3.90 | 0.127 | -- | 0.154 |
| E4 | 3.69 | -- | 4.55 | 0.145 | -- | 0.179 |
| L | 0.61 | -- | 1.80 | 0.024 | -- | 0.071 |
| L2 | 0.05 | -- | 0.36 | 0.002 | -- | 0.014 |
| e | -- | 1.27 | -- | -- | 0.050 | -- |

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