

Description

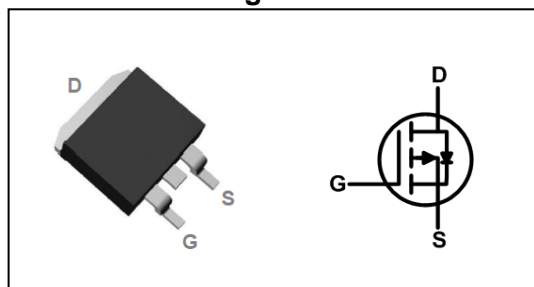
The HSH6115 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSH6115 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | -60 | V |
| $R_{DS(ON),max}$ | 25 | m Ω |
| I_D | -45 | A |

TO263 Pin Configuration

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | -60 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current ¹ | -45 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current ¹ | -34 | A |
| I_{DM} | Pulsed Drain Current ² | -90 | A |
| EAS | Single Pulse Avalanche Energy ³ | 113 | mJ |
| I_{AS} | Avalanche Current | -47.6 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 86.8 | 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 | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 1.44 | $^\circ C/W$ |

Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------------|--|--|------|------|-----------|------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -60 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=-10V, I_D=-18A$ | --- | --- | 25 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-12A$ | --- | --- | 33 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -1.0 | --- | -2.5 | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=-48V, V_{GS}=0V, T_J=25\text{ }^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=-48V, V_{GS}=0V, T_J=55\text{ }^\circ\text{C}$ | --- | --- | 5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| g_{fs} | Forward Transconductance | $V_{DS}=-10V, I_D=-18A$ | --- | 23 | --- | S |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$ | --- | 7 | 14 | Ω |
| Q_g | Total Gate Charge (-4.5V) | $V_{DS}=-20V, V_{GS}=-4.5V, I_D=-12A$ | --- | 25 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 6.7 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 5.5 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-1A$ | --- | 38 | --- | ns |
| T_r | Rise Time | | --- | 23.6 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 100 | --- | |
| T_f | Fall Time | | --- | 6.8 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$ | --- | 3635 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 224 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 141 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|--|--|------|------|------|------|
| I_S | Continuous Source Current ^{1,5} | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | -45 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=-1A, T_J=25\text{ }^\circ\text{C}$ | --- | --- | -1 | V |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-47.6A$
- 4.The power dissipation is limited by 150 $^\circ\text{C}$ junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

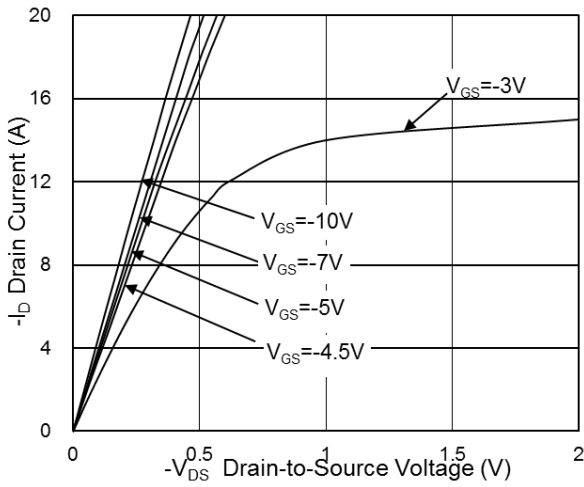


Fig.1 Typical Output Characteristics

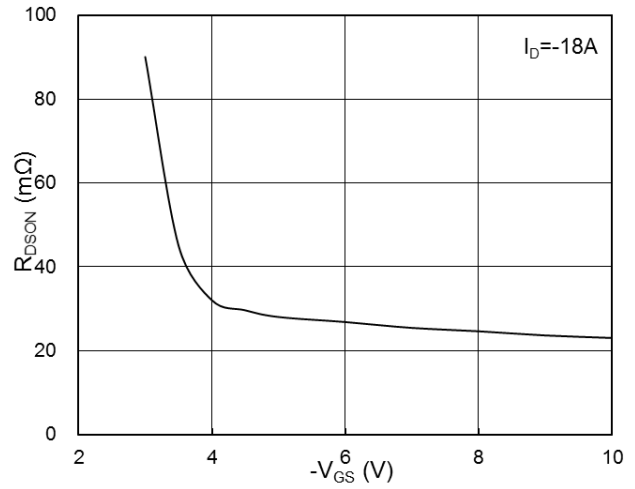


Fig.2 On-Resistance vs. G-S Voltage

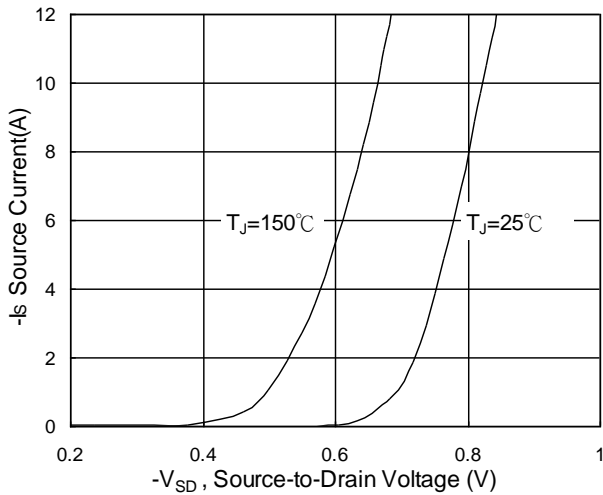


Fig.3 Source Drain Forward Characteristics

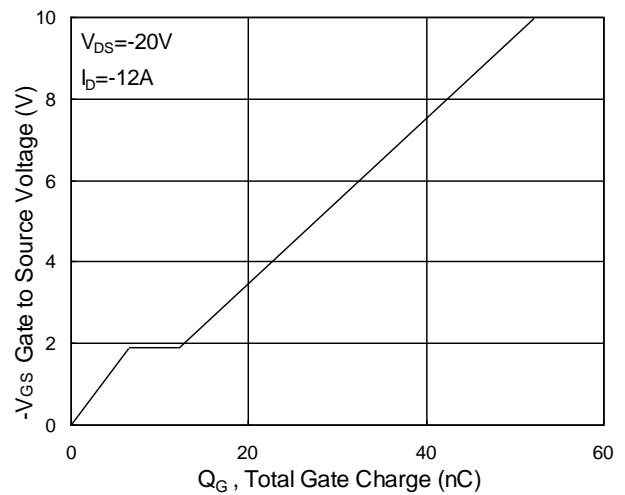


Fig.4 Gate-Charge Characteristics

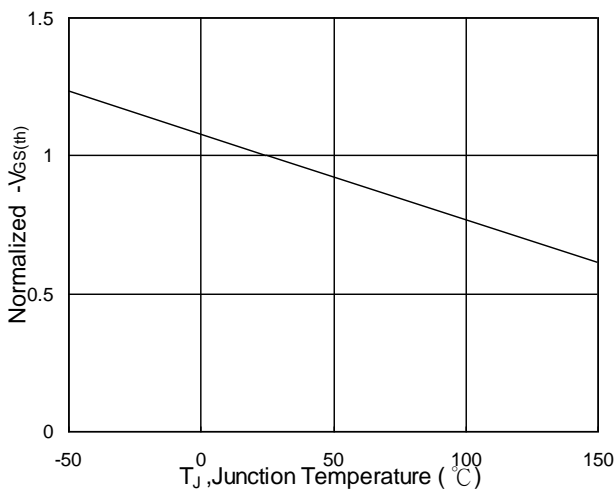


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

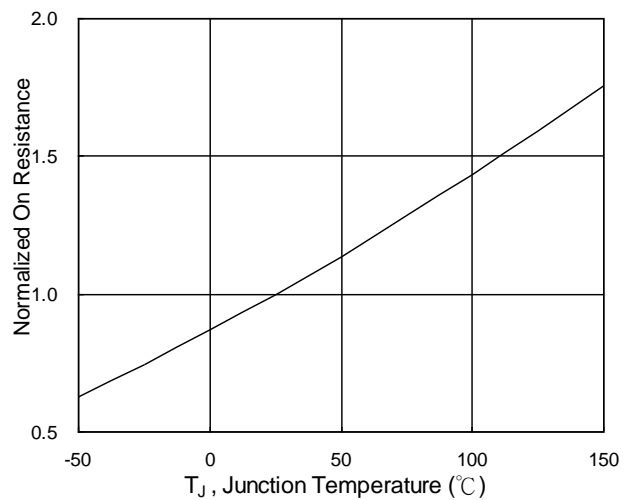


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

P-Ch 60V Fast Switching MOSFETs

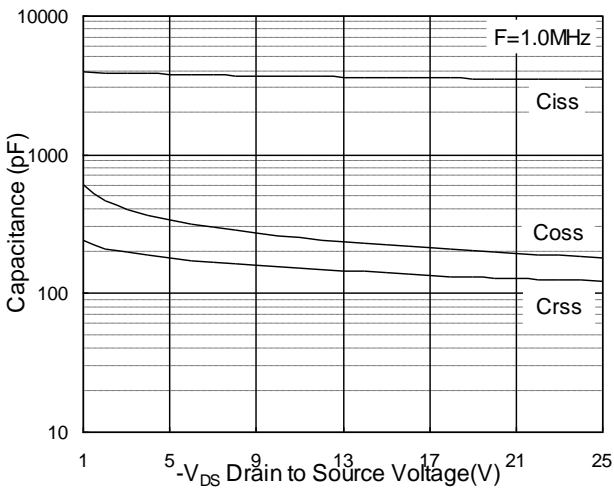


Fig.7 Capacitance

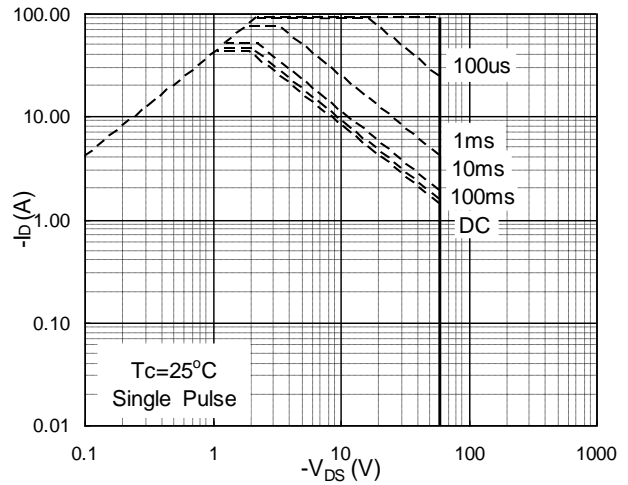


Fig.8 Safe Operating Area

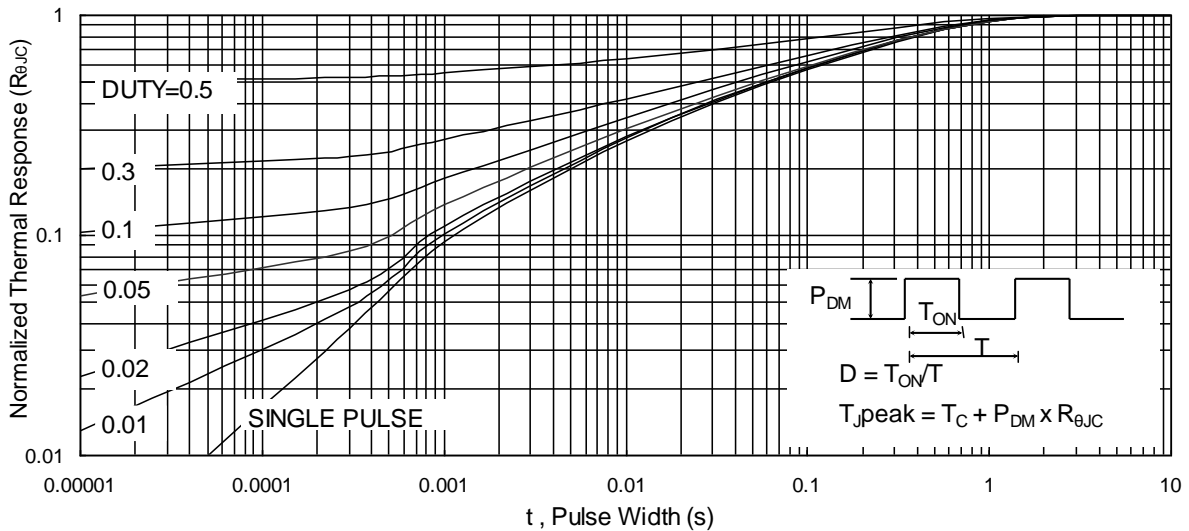


Fig.9 Normalized Maximum Transient Thermal Impedance

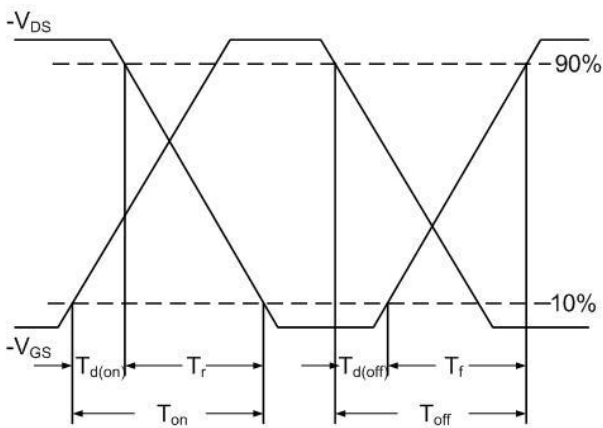


Fig.10 Switching Time Waveform

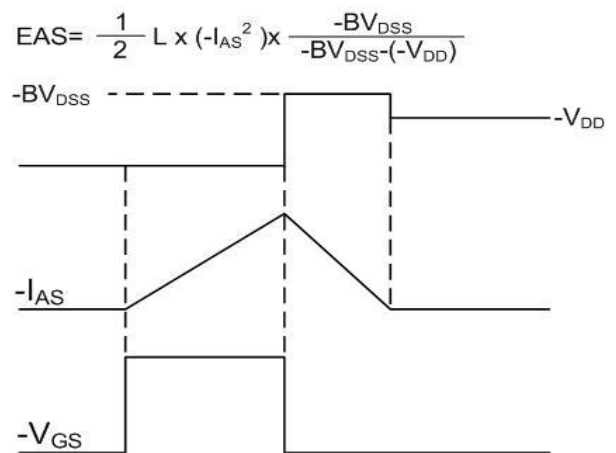
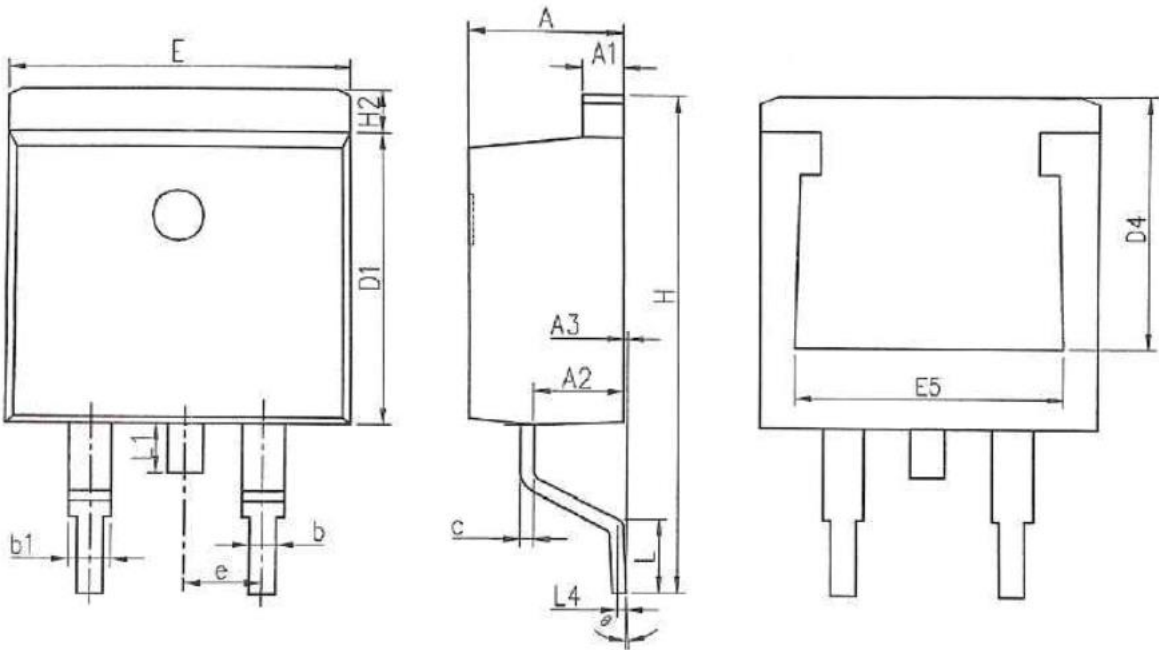


Fig.11 Unclamped Inductive Waveform



| SYMBOLS | MILLIMETERS | | INCHES | |
|---------|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.370 | 4.770 | 0.172 | 0.188 |
| A1 | 1.220 | 1.420 | 0.048 | 0.056 |
| A2 | 2.200 | 2.890 | 0.087 | 0.114 |
| A3 | 0.000 | 0.250 | 0.000 | 0.010 |
| b | 0.700 | 0.960 | 0.028 | 0.038 |
| b1 | 1.170 | 1.470 | 0.046 | 0.058 |
| c | 0.300 | 0.530 | 0.012 | 0.021 |
| D1 | 8.500 | 9.300 | 0.335 | 0.366 |
| D4 | 6.600 | - | 0.260 | - |
| E | 9.860 | 10.36 | 0.388 | 0.408 |
| E5 | 7.060 | - | 0.278 | - |
| e | 2.540 BSC | | 0.100 BSC | |
| H | 14.70 | 15.70 | 0.579 | 0.618 |
| H2 | 1.070 | 1.470 | 0.042 | 0.058 |
| L | 2.000 | 2.600 | 0.079 | 0.102 |
| L1 | 1.400 | 1.750 | 0.055 | 0.069 |
| L4 | 0.250 BSC | | 0.010 BSC | |
| Θ | 0° | 9° | 0° | 9° |

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