

Dual N-Ch 40V Fast Switching MOSFETs

Description

The HSM4204 is the high cell density trenched N-ch MOSFETs, which provide excellent R_{DS(ON)} and gate charge for most of the synchronous buck converter applications.

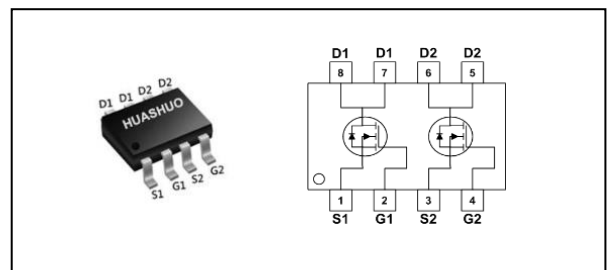
The HSM4204 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- 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} | 40 | V |
| R _{DS(ON),typ} | 12 | mΩ |
| I _D | 7.5 | A |

SOP8 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 _A =25°C | Continuous Drain Current, V _{GS} @ 10V ₁ | 7.5 | A |
| I _D @T _A =70°C | Continuous Drain Current, V _{GS} @ 10V ₁ | 6 | A |
| I _{DM} | Pulsed Drain Current ₂ | 30 | A |
| EAS | Single Pulse Avalanche Energy ₃ | 31 | mJ |
| I _{AS} | Avalanche Current | 25 | A |
| P _D @T _A =25°C | Total Power Dissipation ₄ | 1.5 | W |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|---|------|------|------|
| R _{θJA} | Thermal Resistance Junction-ambient (Steady State) ₁ | --- | 85 | °C/W |
| R _{θJC} | Thermal Resistance Junction-Case ₁ | --- | 36 | °C/W |



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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|--|--|------|-------|------|-------|
| B _{VDS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 40 | --- | --- | V |
| ΔB _{VDS} /ΔT _J | B _{VDS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.034 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ₂ | V _{GS} =10V, I _D =6A | --- | 12 | 15 | mΩ |
| | | V _{GS} =4.5V, I _D =3A | --- | 17 | 20 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.0 | --- | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -5.64 | --- | mV/°C |
| 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 |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =6A | --- | 31 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.1 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =20V, V _{GS} =4.5V, I _D =6A | --- | 10.7 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 3.3 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 4.2 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =12V, V _{GS} =10V, R _G =3.3Ω I _D =6A | --- | 8.6 | --- | ns |
| T _r | Rise Time | | --- | 3.4 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 25 | --- | |
| T _f | Fall Time | | --- | 2.2 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 1314 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 120 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 88 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current _{1,5} | V _G =V _D =0V, Force Current | --- | --- | 7.5 | A |
| I _{SM} | Pulsed Source Current _{2,5} | | --- | --- | 30 | A |
| V _{SD} | Diode Forward Voltage ₂ | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | 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 ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=25A
- 4.The power dissipation is limited by 175°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.

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Typical Characteristics

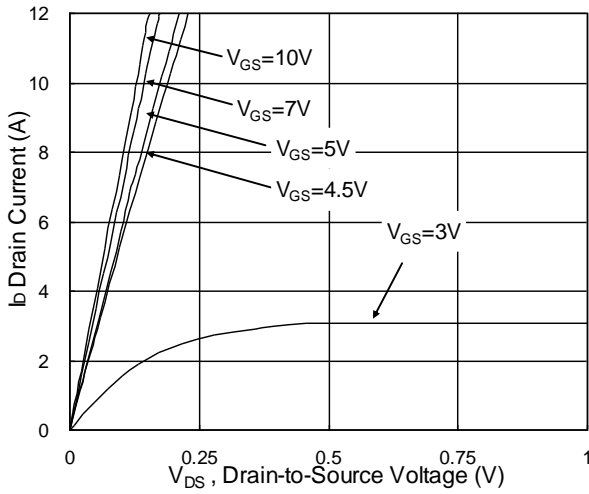


Fig.1 Typical Output Characteristics

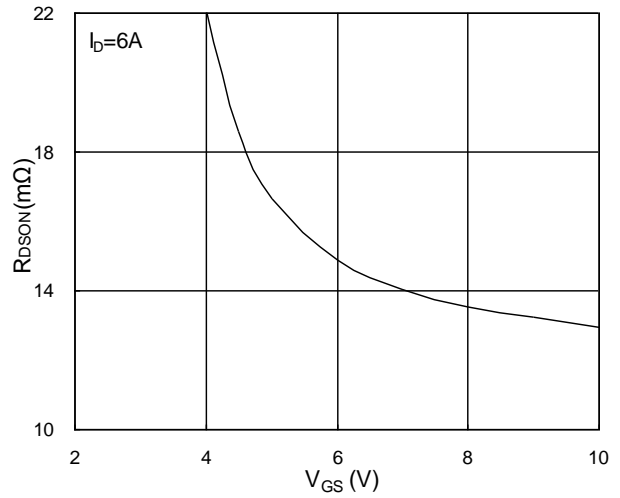


Fig.2 On-Resistance vs. G-S Voltage

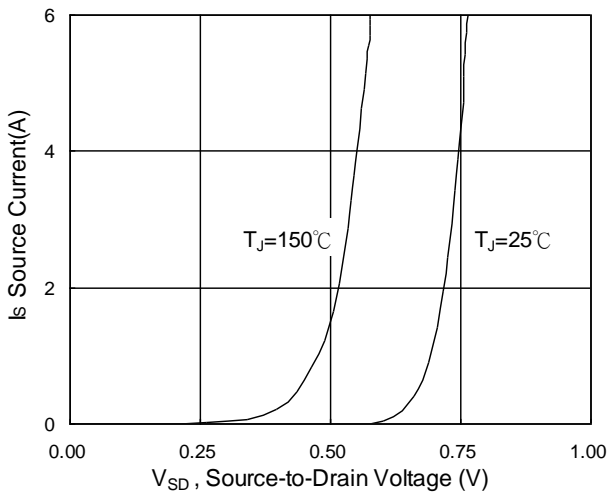


Fig.3 Forward Characteristics of Reverse

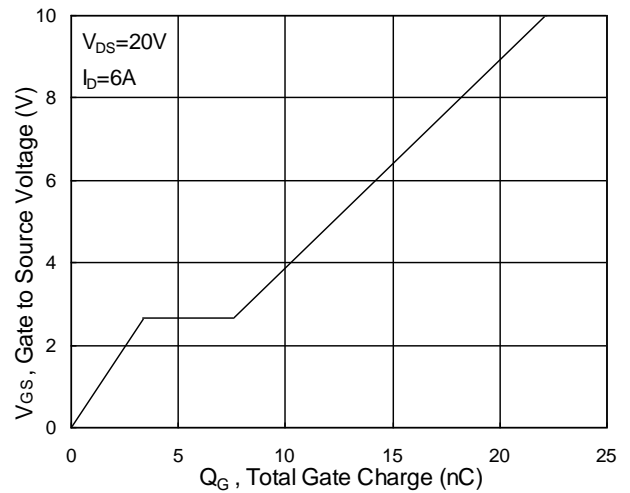


Fig.4 Gate-Charge Characteristics

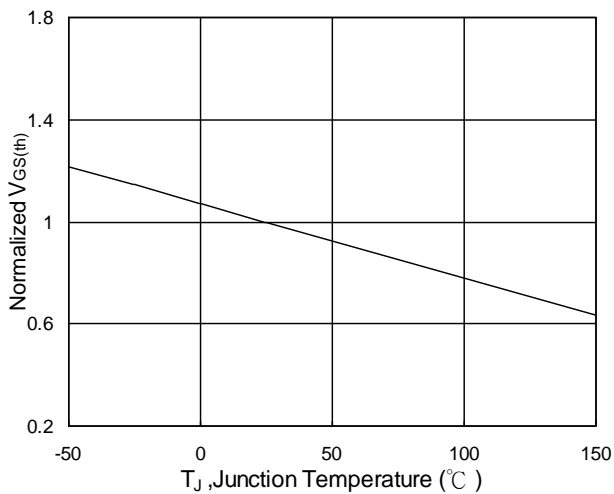


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

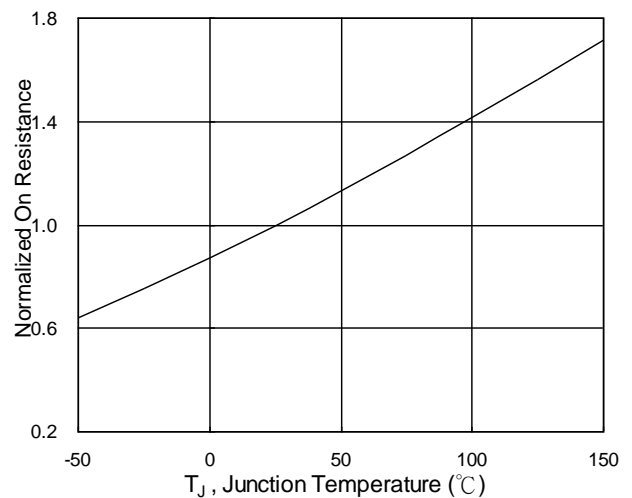


Fig.6 Normalized R_{bSON} vs. T_J



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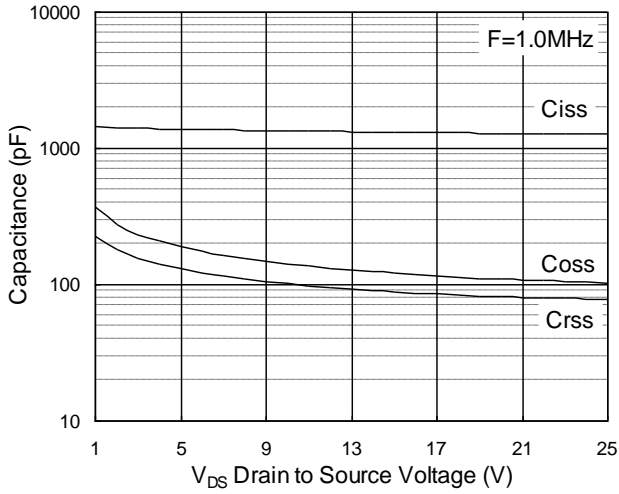


Fig.7 Capacitance

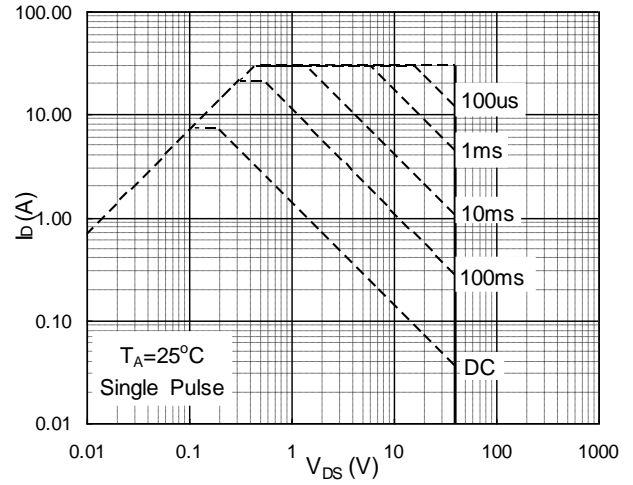


Fig.8 Safe Operating Area

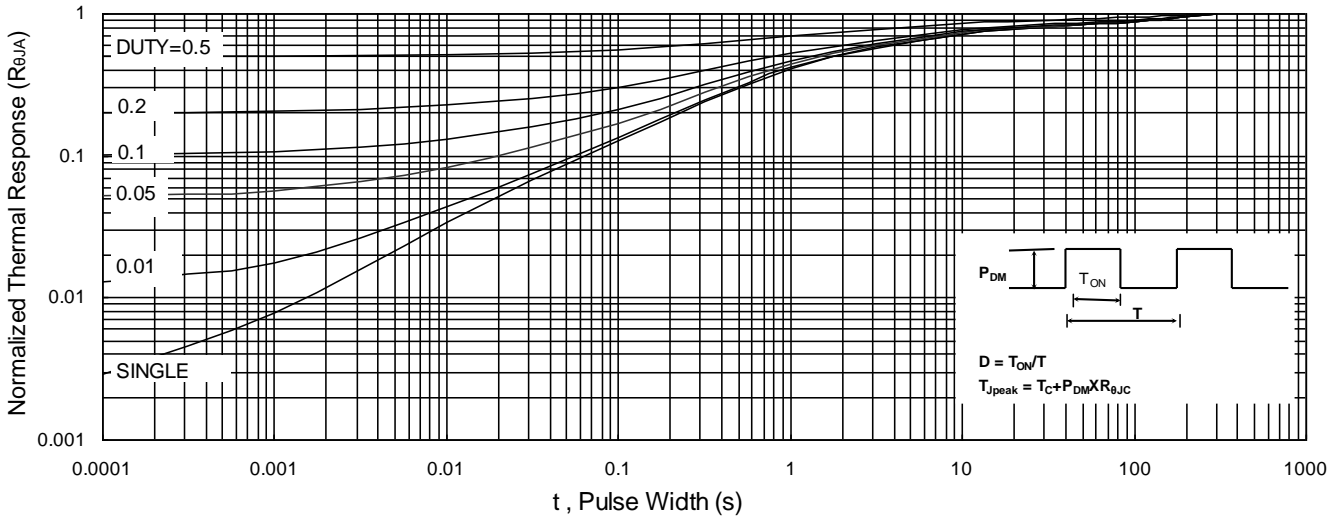


Fig.9 Normalized Maximum Transient Thermal Impedance

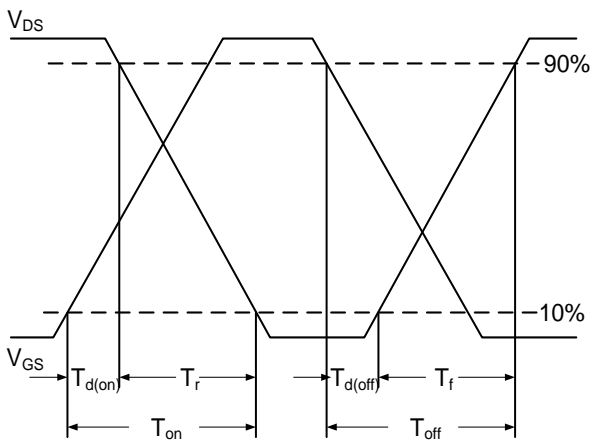


Fig.10 Switching Time Waveform

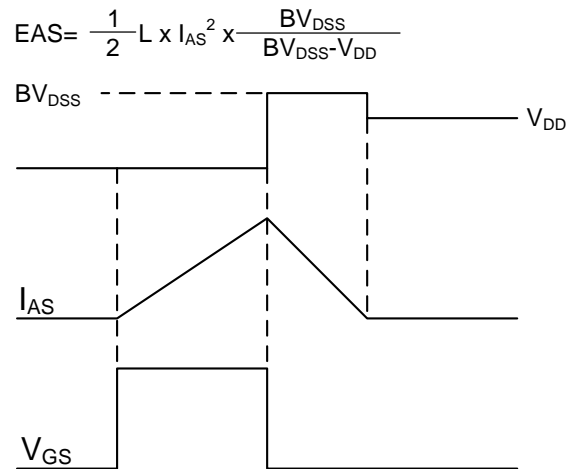
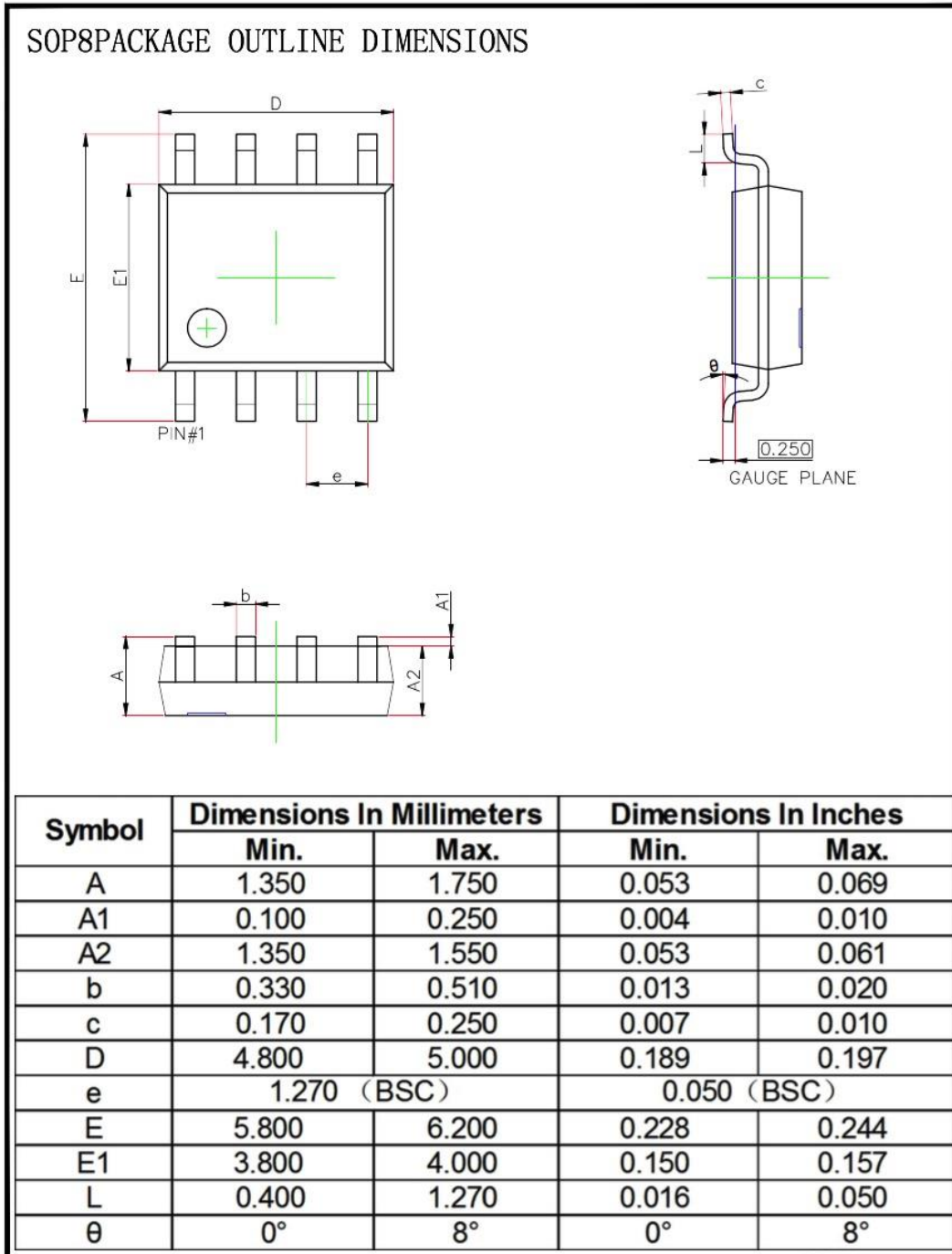


Fig.11 Unclamped Inductive Switching



Ordering Information

| Part Number | Package code | Packaging |
|-------------|--------------|----------------|
| HSM4204 | SOP-8 | 2500/Tape&Reel |



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