

HAT2215R-VB Datasheet

N-Channel 80 V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|-----------------|---------------------------|------------------------|--------------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) ^a | Q_g (Typ.) |
| 80 | 0.062 at $V_{GS} = 10$ V | 3.5 | 7.3 nC |
| | | | |

FEATURES

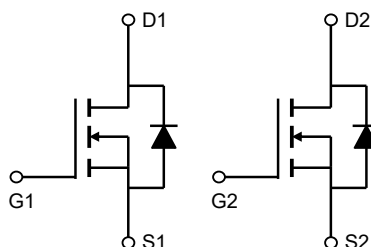
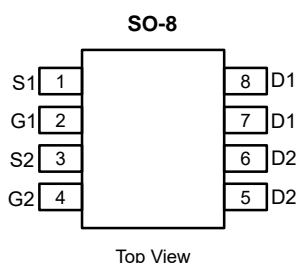
- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- DC/DC Conversion
- Notebook System Power



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

| Parameter | Symbol | Maximum | Units |
|---|------------------------|------------|------------------|
| Drain-Source Voltage | V_{DS} | 80 | V |
| Gate-Source Voltage | V_{GS} | ± 30 | V |
| Continuous Drain Current | I_D | 3.5 | A |
| $T_A=25^\circ\text{C}$ | | | |
| Current | $T_A=70^\circ\text{C}$ | 2.9 | |
| Pulsed Drain Current ^c | I_{DM} | 18 | |
| Avalanche Current ^c | I_{AR} | 16 | A |
| Repetitive avalanche energy $L=0.1\text{mH}$ ^c | E_{AR} | 12.8 | mJ |
| Power Dissipation ^b | P_D | 2 | W |
| $T_A=25^\circ\text{C}$ | | | |
| | $T_A=70^\circ\text{C}$ | 1.3 | |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Units |
|--|-----------------|-----|------|--------------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 48 | 62.5 | $^\circ\text{C/W}$ |
| $t \leq 10\text{s}$ | | | | |
| Maximum Junction-to-Ambient ^{A,D} | $R_{\theta JA}$ | 74 | 90 | $^\circ\text{C/W}$ |
| Steady-State | | | | |
| Maximum Junction-to-Lead | $R_{\theta JL}$ | 32 | 40 | $^\circ\text{C/W}$ |
| Steady-State | | | | |

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|--|--|-----|-------------|--------|---------------|
| STATIC PARAMETERS | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$ | 80 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=80\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$ | | | 1 5 | μA |
| I_{GSS} | Gate-Body leakage current | $V_{DS}=0\text{V}$, $V_{GS}=\pm 30\text{V}$ | | | 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$ | 3.5 | 4.2 | 5 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$ | 18 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10\text{V}$, $I_D=3.5\text{A}$ $T_J=125^\circ\text{C}$ | | 62 113.0 | | m Ω |
| g_{FS} | Forward Transconductance | $V_{DS}=5\text{V}$, $I_D=3.5\text{A}$ | | 15 | | S |
| V_{SD} | Diode Forward Voltage | $I_S=1\text{A}$, $V_{GS}=0\text{V}$ | | 0.77 | 1 | V |
| I_S | Maximum Body-Diode Continuous Current | | | | 2.5 | A |
| I_{SM} | Pulsed Body-diode Current ^C | | | | 18 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0\text{V}$, $V_{DS}=40\text{V}$, $f=1\text{MHz}$ | 510 | 640 | 770 | pF |
| C_{oss} | Output Capacitance | | 28 | 40 | 52 | pF |
| C_{rss} | Reverse Transfer Capacitance | | 12 | 20 | 30 | pF |
| R_g | Gate resistance | $V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$ | 0.9 | 1.8 | 2.7 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| $Q_{g(10V)}$ | Total Gate Charge | $V_{GS}=10\text{V}$, $V_{DS}=40\text{V}$, $I_D=3.5\text{A}$ | 8 | 11 | 13 | nC |
| $Q_{g(4.5V)}$ | Total Gate Charge | | 4 | 5.5 | 7 | |
| Q_{gs} | Gate Source Charge | | 4 | 5 | 6 | nC |
| Q_{gd} | Gate Drain Charge | | 0.7 | 1.2 | 1.7 | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}=10\text{V}$, $V_{DS}=40\text{V}$, $R_L=8\Omega$, $R_{GEN}=3\Omega$ | | 7.2 | | ns |
| t_r | Turn-On Rise Time | | | 2.2 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 17 | | ns |
| t_f | Turn-Off Fall Time | | | 2 | | ns |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=3.5\text{A}$, $dI/dt=300\text{A}/\mu\text{s}$ | 14 | 20 | 26 | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | $I_F=3.5\text{A}$, $dI/dt=300\text{A}/\mu\text{s}$ | 35 | 50 | 65 | nC |

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

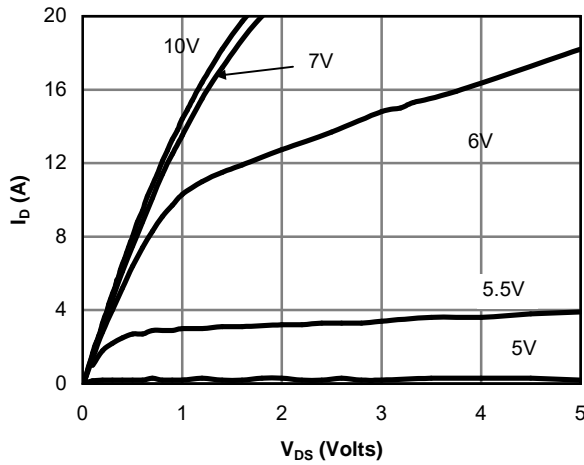


Fig 1: On-Region Characteristics (Note E)

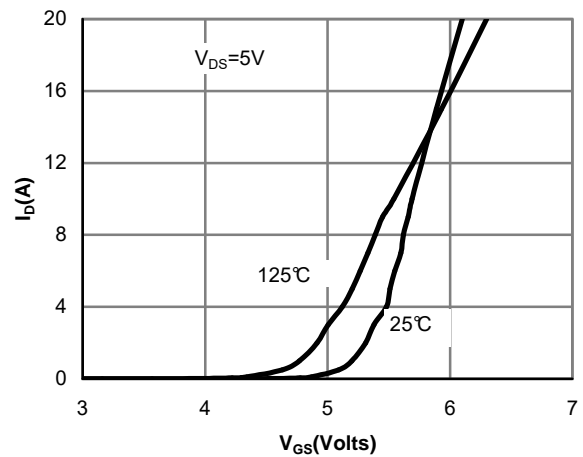


Figure 2: Transfer Characteristics (Note E)

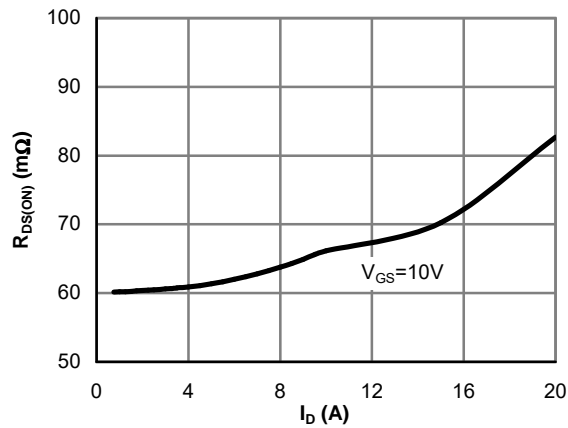


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

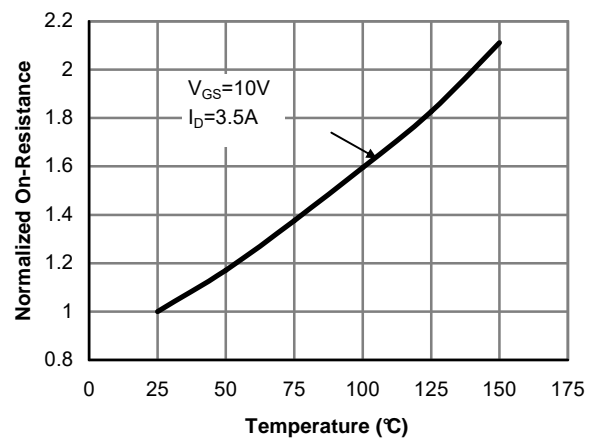


Figure 4: On-Resistance vs. Junction Temperature (Note E)

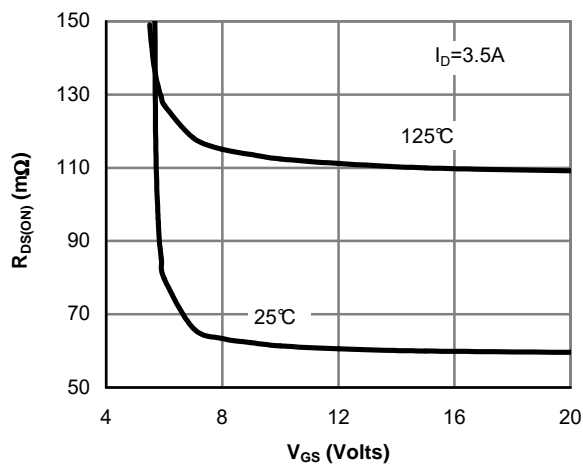


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

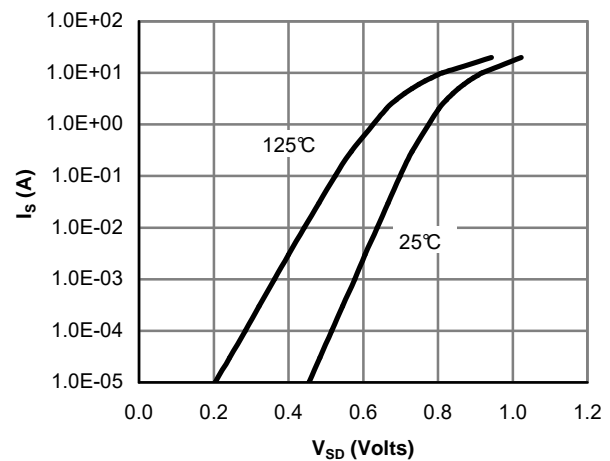
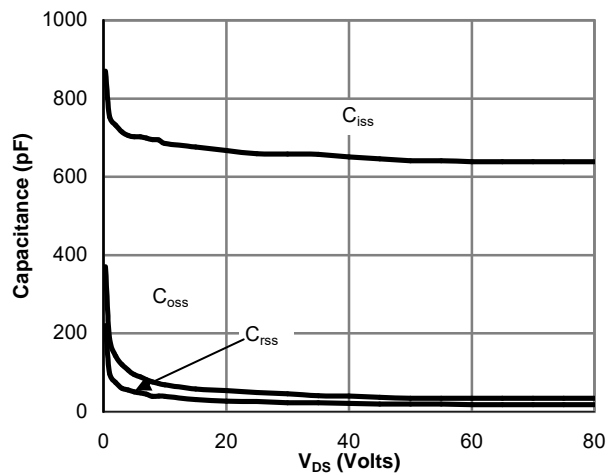


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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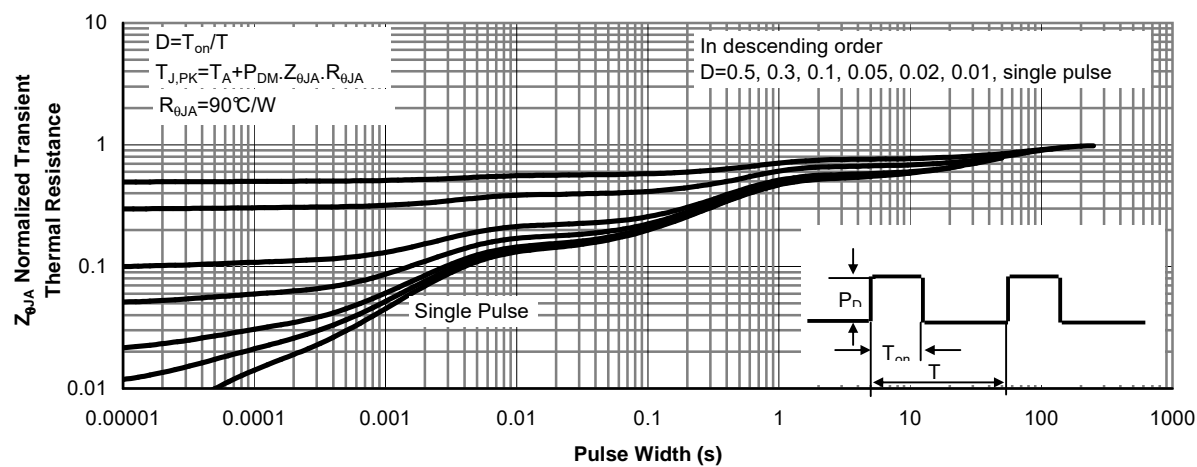
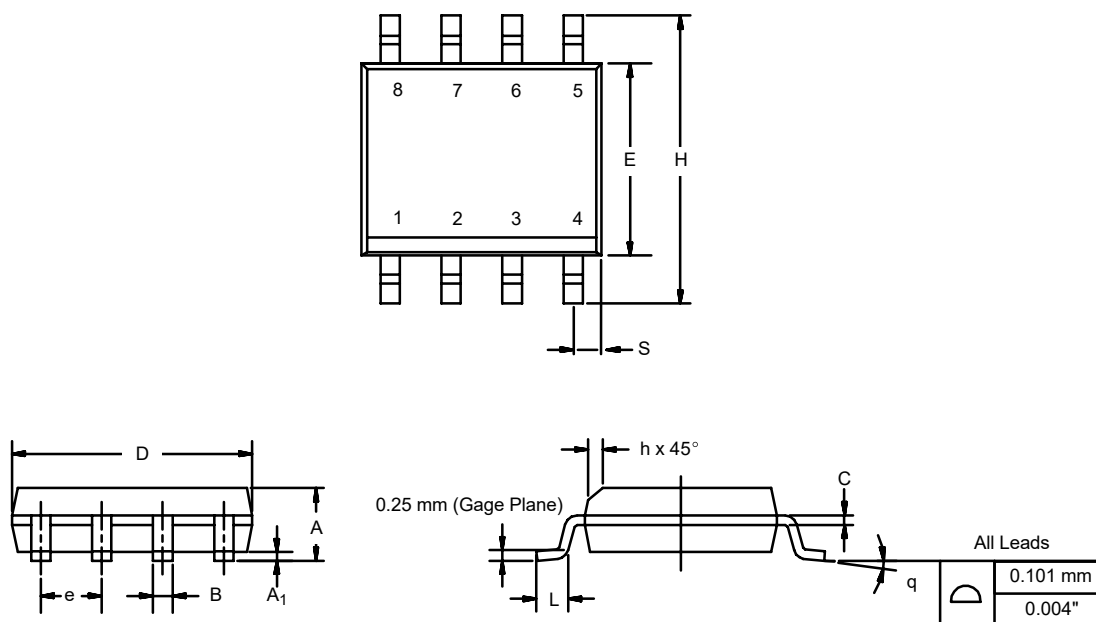


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



| DIM | MILLIMETERS | | INCHES | |
|--------------------------------|-------------|------|-----------|-------|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| A ₁ | 0.10 | 0.20 | 0.004 | 0.008 |
| B | 0.35 | 0.51 | 0.014 | 0.020 |
| C | 0.19 | 0.25 | 0.0075 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.196 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 BSC | | 0.050 BSC | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| h | 0.25 | 0.50 | 0.010 | 0.020 |
| L | 0.50 | 0.93 | 0.020 | 0.037 |
| q | 0° | 8° | 0° | 8° |
| S | 0.44 | 0.64 | 0.018 | 0.026 |
| ECN: C-06527-Rev. I, 11-Sep-06 | | | | |
| DWG: 5498 | | | | |

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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APPLICATION NOTE

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