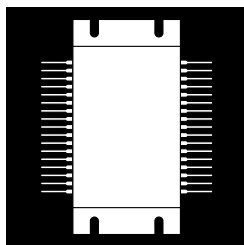


DUAL, LOW VOLTAGE, LOW $R_{DS(on)}$, MOSFET H-BRIDGE CIRCUIT IN A PLASTIC PACKAGE



Dual 50 Volt, 15 And 20 Amp H-Bridge With Current And Temperature Sensing In A Low Profile Plastic Package

FEATURES

- H-Bridge Configuration
- Zener Gate Protection
- 10 m Shunt Resistor
- 2 Linear Thermal Sensors, One For Each Bridge
- Isolated Package
- Output Currents Up To 20 Amps

DESCRIPTION

This series of MOSFET switches is configured as a Dual H-Bridge with common V_{DD} lines, precision series shunt resistor in the source line, and sensing elements to monitor the substrate temperature of each switch. This device is ideally suited for Stepping Motor Control applications where size, performance, and efficiency are key.

2.1

MAXIMUM RATINGS ($T_C = @ 25^\circ\text{C}$)

| Part Number | V_{DS} (Volts) | $R_{DS(on)}$ (m) | I_D (Amps) | Package |
|-------------|------------------|------------------|--------------|---------|
| OMH310 | 50 | 100 | 15 | MP-3 |
| OMH315 | 50 | 70 | 20 | MP-3 |

ABSOLUTE MAXIMUM RATINGS ($T_C = @ 25^\circ\text{C}$ unless otherwise noted)

| Parameter | OMH310 | OMH315 | Units |
|---|--------|--------|--------------------|
| Drain Source Voltage, V_{DS} | 50 | 50 | V |
| Drain-Gate ($R_{GS} = 1\text{m}$), V_{DGR} | 50 | 50 | V |
| Continuous Drain Current, $I_D @ T_C = 25^\circ\text{C}$ | 15 | 25 | A |
| $I_D @ T_C = 70^\circ\text{C}$ | 11 | 16 | A |
| Pulse Drain Current, $I_{DM}^{(1)}$ | 56 | 100 | A |
| Maximum Power Dissipation, $P_D @ T_C = 25^\circ\text{C}^{(2)}$ | 20 | 50 | W |
| $P_D @ T_C = 70^\circ\text{C}^{(2)}$ | 11 | 18 | W |
| Linear Derating Factor, Junction-To-Case | 0.2 | 0.33 | W/C |
| Thermal Resistance, Junction-To-Case | 5.0 | 3.0 | $^\circ\text{C/W}$ |

Notes:

(1) Pulse Test: Pulse width 300 sec. Duty Cycle 1.5%. (2) Maximum Junction Temperature = 125°C .

OMH310 OMH315

ELECTRICAL CHARACTERISTICS: OMH310 (T_C = 25° unless otherwise specified)

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|----------------|--------|------|------|------|------|
|----------------|--------|------|------|------|------|

OFF CHARACTERISTICS

| | | | | | |
|---|----------------------|----|---|-------|----|
| Drain-Source Breakdown Voltage, I _D = 250 μA, V _{GS} = 0 | V _{(BR)DSS} | 50 | - | - | V |
| Zero Gate Voltage Drain Current = V _{GS} , V _{DS} = Max. Rat. V _{DS} = Max. Rat. x 0.8, T _C = 70°C | I _{DSS} | - | - | 25.0 | μA |
| | | - | - | 500.0 | μA |
| Gate-Body Leakage, V _{GS} = ±12 V | I _{GSS} | - | - | ±500 | nA |

ON CHARACTERISTICS

| | | | | | |
|---|---------------------|-----|---|-----|---|
| Gate-Threshold Voltage, V _{DS} = V _{GS} , I _D = 250 μA | V _{GS(th)} | 2.0 | - | 4.0 | V |
| Static Drain-Source On-Resistance, V _{GS} = 10 Vdc, I _D = 9.0 A T _C = 70°C | R _{DS(on)} | - | - | 0.1 | |
| | | - | - | 0.2 | |
| On State Drain Current, V _{DS} > I _{D(on)} X R _{DS(on)} Max., V _{GS} = 10 V | I _{D(on)} | 15 | - | - | A |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|--|--|------------------|---|---|-----|----|
| Forward Transconductance, V _{DS} > I _{D(on)} X R _{DS(on)} Max., I _D = 9.0A | g _{fs} | 3.0 | - | - | mho | |
| Input Capacitance | V _{DS} = 25 V, V _{GS} = 0, f = 1.0 MHz | C _{iss} | - | - | 650 | pF |
| Output Capacitance | | C _{oss} | - | - | 450 | pF |
| Reverse Transfer Capacitance | | C _{rss} | - | - | 280 | pF |

SWITCHING CHARACTERISTICS

| | | | | | | |
|---------------------|---|---------------------|---|---|-----|----|
| Turn-On Delay Time | V _{DD} = 30 V, I _D = 3 A, R _{GS} = 50 Ω, V _{GS} = 10 V | t _{d(on)} | - | - | 30 | ns |
| Rise Time | | t _r | - | - | 85 | ns |
| Turn-Off Delay Time | | t _{d(off)} | - | - | 90 | ns |
| Fall Time | | t _f | - | - | 110 | ns |

SOURCE DRAIN DIODE CHARACTERISTICS

| | | | | | | |
|---|--|--------------------|---|------|-----|----|
| Source - Drain Current | | I _{SD} | - | - | 14 | A |
| Source - Drain Current Pulsed | | I _{SDM} * | - | - | 56 | A |
| Forward On-Voltage, I _{SD} = 28 A, V _{GS} = 0 | | V _{SD} | - | - | 1.8 | V |
| Reverse Recovery Time | I _{SD} = 13 A, di/dt = 100 A/μSec | t _{rr} | - | 120 | - | ns |
| Reverse Recovered Charge | | Q _{rr} | - | 0.15 | - | μC |

RESISTOR CHARACTERISTICS

| | | | | | |
|---|-----------------|-----|-----|----|-----|
| Resistor Tolerance | R _s | 9.0 | 10 | 11 | m |
| Temperature Coefficient, -40°C to +70°C | T _{cr} | - | 100 | - | ppm |

* Indicates Pulse Test 300 μsec, Duty Cycle 1.5%

ELECTRICAL CHARACTERISTICS: OMH315A ($T_C = 25^\circ$ unless otherwise specified)

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|----------------|--------|------|------|------|------|
|----------------|--------|------|------|------|------|

OFF CHARACTERISTICS

| | | | | | |
|---|---------------|----|---|-----------|---------|
| Drain-Source Breakdown Voltage, $I_D = 250 \mu A$, $V_{GS} = 0$ | $V_{(BR)DSS}$ | 50 | - | - | V |
| Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$ $V_{DS} = \text{Max. Rat.} \times 0.8$, $T_C = 70^\circ C$ | I_{DSS} | - | - | 250 | μA |
| | | - | - | 750 | μA |
| Gate-Body Leakage, $V_{GS} = \pm 12 V$ | I_{GSS} | - | - | ± 500 | nA |

ON CHARACTERISTICS

| | | | | | |
|--|--------------|-----|---|------|---|
| Gate-Threshold Voltage, $V_{DS} = V_{GS}$, $I_D = 250 \mu A$ | $V_{GS(th)}$ | 2.0 | - | 4.0 | V |
| Static Drain-Source On-Resistance, $V_{GS} = 10 V_{dc}$, $I_D = 10 A$ $T_C = 70^\circ C$ | $R_{DS(on)}$ | - | - | 0.07 | |
| | | - | - | 0.14 | |
| On State Drain Current, $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $V_{GS} = 10 V$ | $I_{D(on)}$ | 20 | - | - | A |

DYNAMIC CHARACTERISTICS

| | | | | | |
|---|--|-----------|---|------|-----|
| Forward Transconductance, $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $I_D = 10 A$ | g_{fs} | 5.0 | - | - | mho |
| Input Capacitance | $V_{DS} = 25 V$, $V_{GS} = 0$, $f = 1.0 \text{ MHz}$ | C_{iss} | - | 1020 | pF |
| Output Capacitance | | C_{oss} | - | 500 | pF |
| Reverse Transfer Capacitance | | C_{rss} | - | 120 | pF |

SWITCHING CHARACTERISTICS

| | | | | | | |
|---------------------|---|--------------|---|---|----|----|
| Turn-On Delay Time | $V_{DD} = 30 V$, $I_D = 10 A$, $R_{GS} = 4.7 \Omega$, $V_{GS} = 10 V$, $R_L = 2.4 \Omega$ | $t_{d(on)}$ | - | - | 50 | ns |
| Rise Time | | t_r | - | - | 75 | ns |
| Turn-Off Delay Time | | $t_{d(off)}$ | - | - | 50 | ns |
| Fall Time | | t_f | - | - | 50 | ns |

SOURCE DRAIN DIODE CHARACTERISTICS

| | | | | | | |
|--|--|-------------|---|------|-----|---------|
| Source - Drain Current | | I_{SD} | - | - | 25 | A |
| Source - Drain Current (Pulsed) | | I_{SDM}^* | - | - | 100 | A |
| Forward On-Voltage, $I_{SD} = 28 A$, $V_{GS} = 0$ | | V_{SD} | - | - | 2.4 | V |
| Reverse Recovery Time | $I_{SD} = 13 A, di/dt = 100 A/\mu Sec$ | t_{rr} | - | 100 | - | ns |
| Reverse Recovered Charge | | Q_{rr} | - | 0.15 | - | μC |

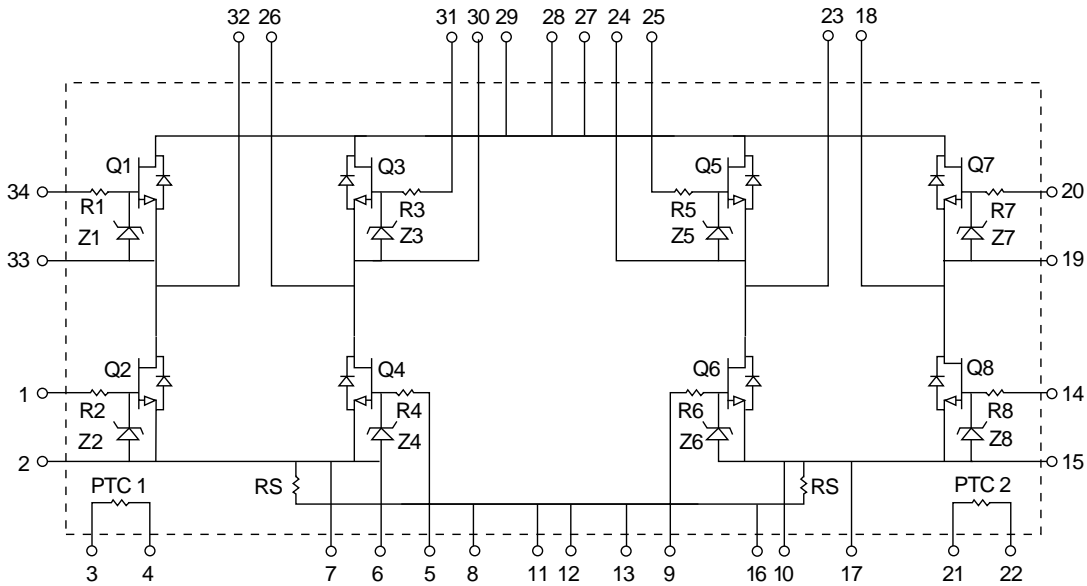
RESISTOR CHARACTERISTICS

| | | | | | |
|---|----------|-----|-----|----|-----|
| Resistor Tolerance | R_S | 9.0 | 10 | 11 | m |
| Temperature Coefficient, $-40^\circ C$ to $+70^\circ C$ | T_{cr} | - | 100 | - | ppm |

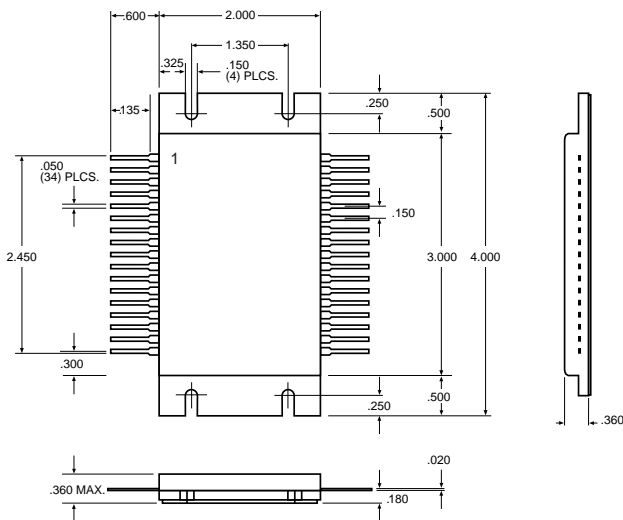
* Indicates Pulse Test 300 μsec , Duty Cycle 1.5%

2.1

SCHEMATIC



MECHANICAL OUTLINE



- | | |
|----------------------|-----------------------|
| Pin 1: Gate Q2 | Pin 34: Gate Q1 |
| Pin 2: Source Q2 | Pin 33: Source Q1 |
| Pin 3: PTC 1 | Pin 32: Output Q1, Q2 |
| Pin 4: PTC 1 | Pin 31: Gate Q3 |
| Pin 5: Gate Q4 | Pin 30: Source Q3 |
| Pin 6: Source Q4 | Pin 29: V_M |
| Pin 7: Sense R 1 | Pin 28: V_M |
| Pin 8: Sense R 1 | Pin 27: V_M |
| Pin 9: Gate Q6 | Pin 26: Output Q3, Q4 |
| Pin 10: Source Q6 | Pin 25: Gate Q5 |
| Pin 11: Return Sense | Pin 24: Source Q5 |
| Pin 12: Return | Pin 23: Output Q5, Q6 |
| Pin 13: Return | Pin 22: +PTC |
| Pin 14: Gate Q8 | Pin 21: -PTC |
| Pin 15: Source Q8 | Pin 20: Gate Q7 |
| Pin 16: Sense R 2 | Pin 19: Source Q7 |
| Pin 17: Sense R 2 | Pin 18: Output Q7, Q8 |

Contact factory for lead bending options.
 Mounting Recommendations: Maximum Mounting Torque: 3.0 mN.
 The module must be attached to a flat heat sink (flatness 100µm maximum).