

Digital Micro Switch Power Relay Evaluation Board

Development Platform for DMS Applications in Power Electronics and Power IoT

Digital Micro Switch Technology (DMS) is a robust Metal-Metal MEMS switch technology from Menlo Microsystems that has found commercial uses in demanding applications such as Magnetic Resonance Imaging (MRI) systems. Originally developed for power electronics applications such as relays as circuit breakers, the DMS technology exhibits many unique features such as thin Surface Mount form factor, zero hold current, low weight, scalability in Voltage/Current Handling and the ability to break a circuit in $<10\mu\text{s}$. Together with the reliability of the metal contact system the technology will enable new applications and integration possibilities where traditional electro-mechanical relays are unsuitable due to size, switching speed and hold current requirements. One example is low-power IoT devices that are used to control several large loads without the requirement for a power supply section.

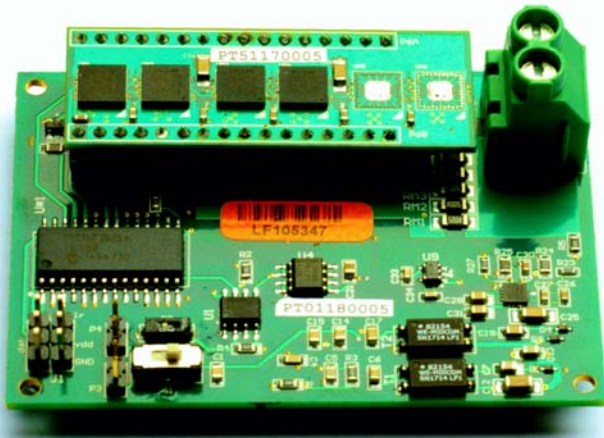


Figure 1: DMS Power Relay Evaluation Board, with carrier for DMS devices on top.

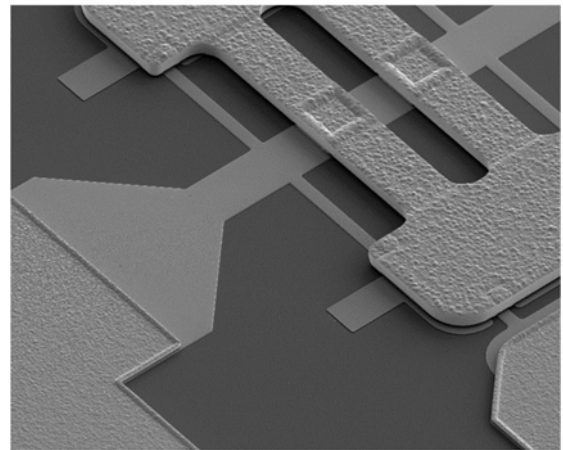


Figure 2: Menlo DMS Technology with two switches connected in series visible.

- Rated Voltage: 200 V_{DC} (Scalable to kV)
- Rated Current: 10 A (Scalable)
- On Resistance: $<30\ \text{m}\Omega$
- Galvanic Isolation 2,500V_{AC}
- Control Current: $<1.0\ \text{mA}$
- Max Switching Frequency: 10 kHz
- Current Sensing & Overcurrent Protection
- No Heat Sink Required

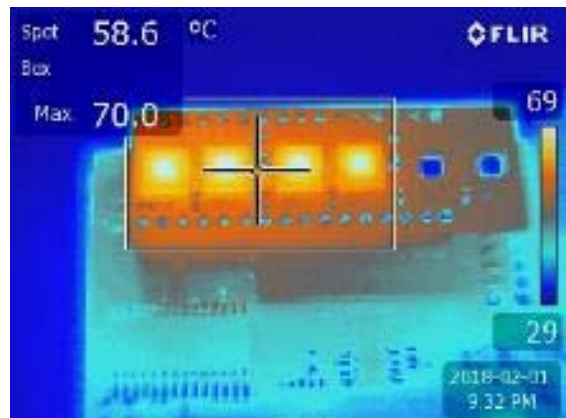


Figure 3: Thermal Camera measurement shows current sharing with 4 DMS devices.

Menlo Microsystems has developed a Power Relay Prototype Platform that uses Digital Micro Switches in a scalable, parallel configuration to handle larger currents. The positive temperature coefficient of the DMS technology enables paralleling devices with stable current sharing between devices. To facilitate tests with one or more configurations the Evaluation Board is divided in Main Board (Control and Isolation) and Carrier Board (DMS devices and MOSFETS). The Carrier boards can be easily removed and replaced to enable testing of different configurations. An Integrated MOSFET assist feature helps assure the voltage over the closing or opening switch is low to prevent arcing. The MOSFET assistance is only active during state transitions and in steady state the MOS-FET assist is de-activated.

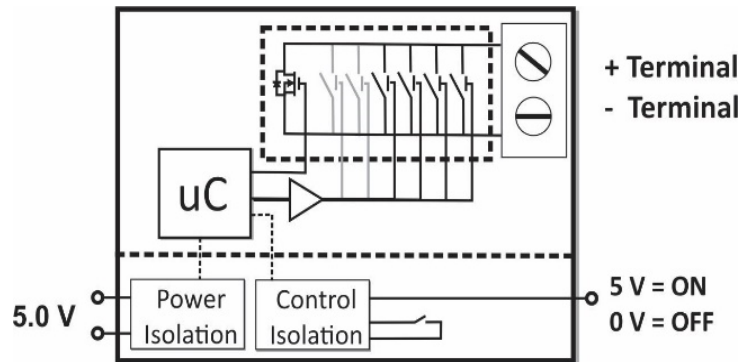
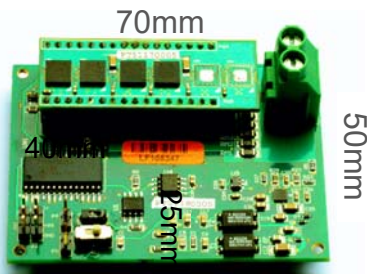


Figure 4: Power Relay Block Diagram

200V/10A – Smart Power Relay Prototype



- Up to 6 DMS
- 48 beams/ DMS device
- 2.5A/DMS device
- <30 mΩ, 10A

Multi-Chip-Module Surface Mount SIP Power Relay Product



- Multiple DMS switches in parallel
- 400 beams/switch
- Single-channel (10A+) roadmap
- Multi-channel (2A+) roadmap

The DMS Evaluation Board is available for parties that wish to evaluate Digital Micro Switch technology in power electronics applications with the goal of developing an integrated SIP power module solution.

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