# MFE8403-EVL

## 20V P-CHANNEL ENHANCEMENT MODE MOSFET-ESD PROTECTED

VENKEL LTD.

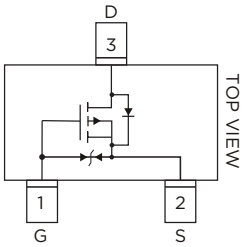
| PART NUMBER | PACKAGE | VOLTAGE | CURRENT | CIRCUIT CONFIGURATION |
|---|---|---|---|---|
| MFE8403-EVL<br>E = 7" Embossed T&R (4,000) | SOT-523 | -20V | -600mA | PIN 1: GATE; PIN 2: SOURCE; PIN 3: DRAIN |

## FEATURES:

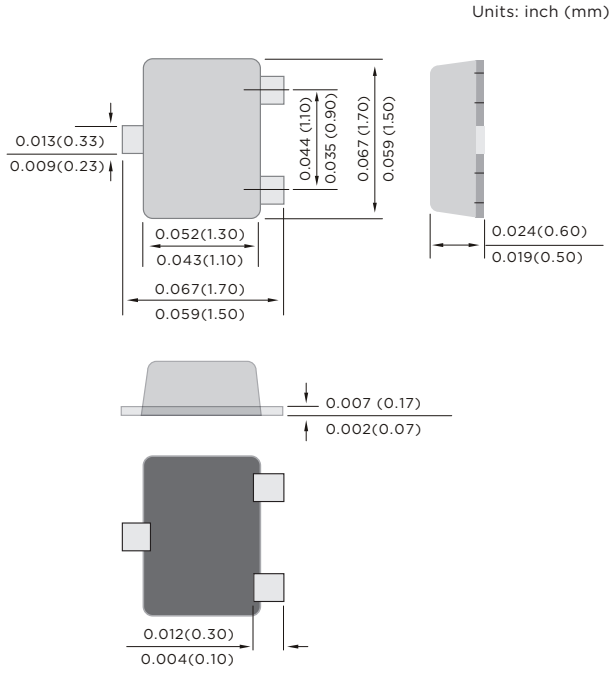
- RDS(ON), VGS@-4.5V, ID@-0.6A<340mΩ
- RDS(ON), VGS@-2.5V, ID@-0.4A<420mΩ
- RDS(ON), VGS@-1.8V, ID@-0.2A<600mΩ
- ESD Protected 2KV HBM
- Specially Designed for Switch Load, PWM Application, etc.
- Advanced Trench Process Technology

## MECHANICAL DATA:

- Case: SOT-523 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.00007 ounces, 0.002 grams
- Marking: E03




## SOT-523




## MAXIMUM RATINGS & THERMAL CHARACTERISTICS

$T_A$=25˚C unless otherwise noted

| PARAMETER | | SYMBOL | LIMIT | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±8 | V |
| Continuous Drain Current | | $I_D$ | -600 | mA |
| Pulsed Drain Current | | $I_{DM}$ | -2400 | mA |
| Power Dissipation | $T_A$=25˚C | $P_D$ | 300 | mW |
| | Derate above 25˚C | | 2.4 | mW/˚C |
| Operating Junction & Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | ˚C |
| Typical Thermal Resistance -Junction to Ambient (NOTE 3) | | $R_{\theta JA}$ | 417 | ˚C/W |

**NOTES:**

1. Pulse width<300us, Duty cycle<2%
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on a 1 inch FR-4 with 2oz. square pad of copper.
4. The maximum current rating is package limited.

## ENVIRONMENTAL INFORMATION

| | |
|---|---|
| **RoHS Status** | 10 of 10 Compliant |
| **REACH Status** | Compliant |
| **Halogen Status** | Halogen Free |
| **Conflict Mineral Status** | Conflict Mineral Free |
| **Moisture Sensitivity Level (MSL)** | 1 |

## ELECTRICAL CHARACTERISTICS

$T_A$=25˚C unless otherwise noted

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=-250uA | -20 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250µA | -0.4 | -0.64 | -1.0 | |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}$=-4.5V, $I_D$=-600mA | - | 280 | 340 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=-400mA | - | 330 | 420 | |
| | | $V_{GS}$=-1.8V, $I_D$=-200mA | - | 420 | 600 | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-20V, $V_{GS}$=0V | - | -0.01 | -1.0 | uA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±8V, $V_{DS}$=0V | - | ±3.5 | ±10 | uA |
| **DYNAMIC** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-10V, $I_D$=-600mA $V_{GS}$=-4.5V (NOTES 1, 2) | - | 2.2 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 0.4 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 0.5 | - | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-10V, $V_{GS}$=0V f=1.0MHz | - | 151 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 27 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 9 | - | |
| **SWITCHING** | | | | | | |
| Turn-On Delay Time | $td_{(on)}$ | $V_{DD}$=-10V, $I_D$=-600mA $V_{GS}$=-4.5V $R_G$=6Ω (NOTES 1, 2) | - | 9 | - | ns |
| Turn-On Rise Time | tr | | - | 37 | - | |
| Turn-Off Delay Time | $td_{(off)}$ | | - | 128 | - | |
| Turn-Off Fall Time | tf | | - | 72 | - | |
| **DRAIN-SOURCE DIODE** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | - | - | - | -400 | mA |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=-1A,$V_{GS}$=0V | - | -0.95 | -1.2 | V |
| | | | | | | |

**NOTES:**

1. Pulse width≤300us, Duty cycle≤2%
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on a 1 inch FR-4 with 2oz. square pad of copper.
4. The maximum current rating is package limited.

## TYPICAL CHARACTERISTICS CURVES

**Fig.1** On-Region Characteristics

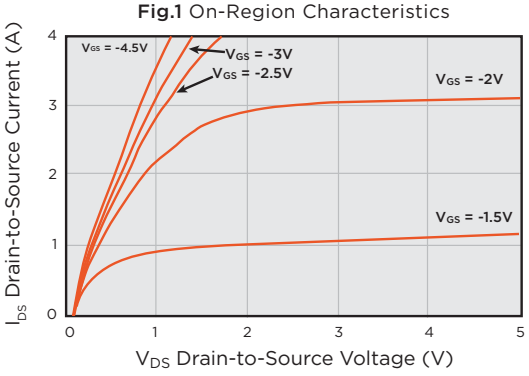



**Fig.2** Transfer Characteristic

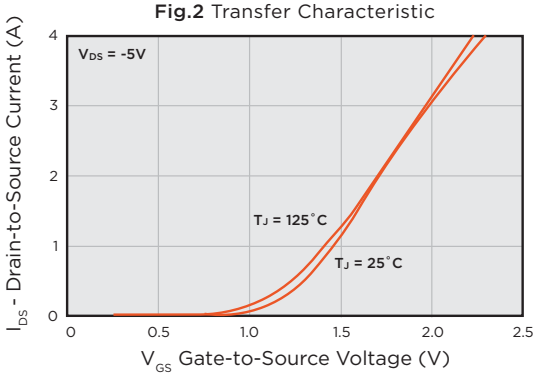



**Fig.3** On-Resistance vs Drain Current

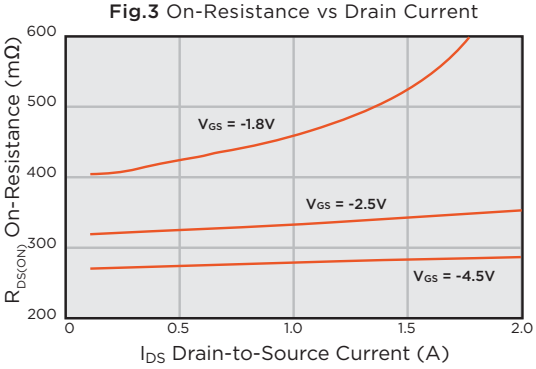



**Fig.4** On-Resistance vs. Junction Temperature

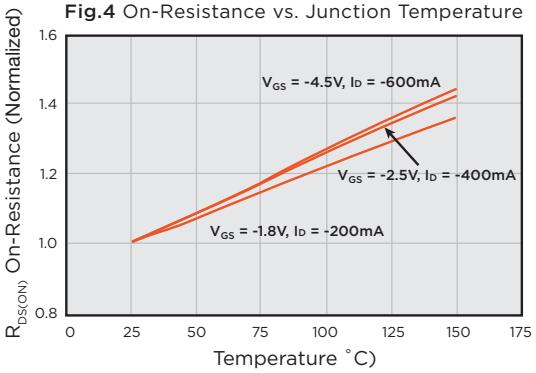



**Fig.5** On-Resistance Variation with VGS

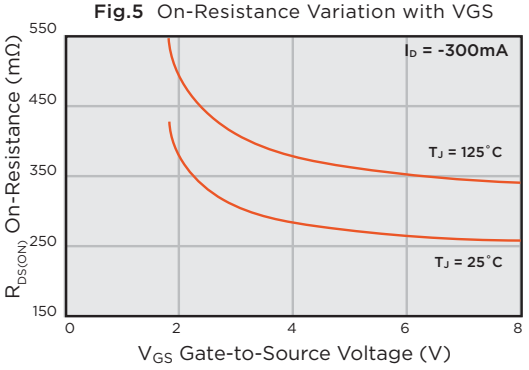



**Fig.6** Body Diode Characterisics

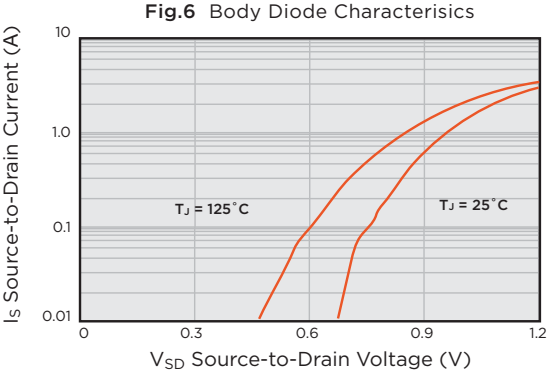



**Fig.7** Gate-Charge Characteristics

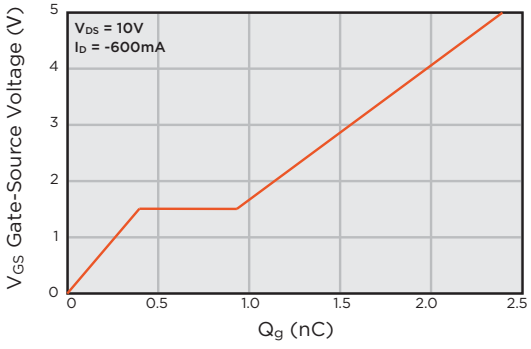
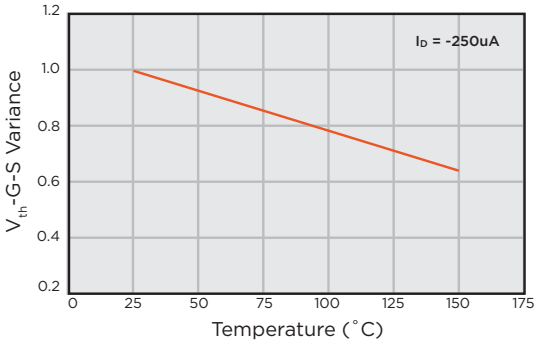
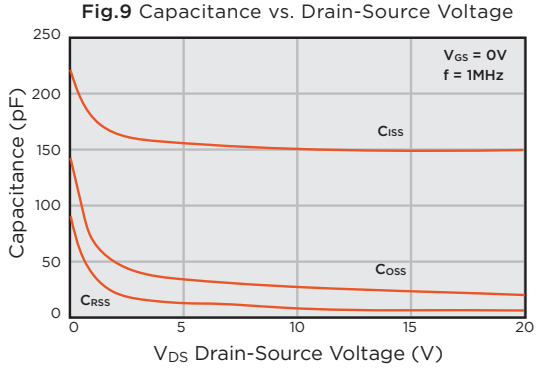


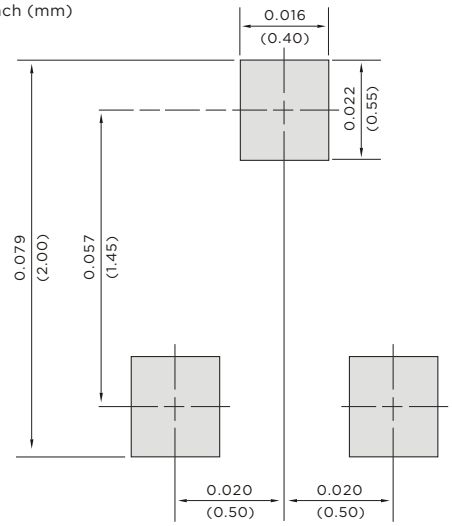

**Fig.8** Threshold Voltage Variation with Temperature



## GRAPHS

**Fig.9** Capacitance vs. Drain-Source Voltage




## MOUNTING PAD LAYOUT

Units: inch (mm)