## P-Channel 20V (D-S) MOSFET

### GENERAL DESCRIPTION

The ME2333 is the P-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application such as cellular phone and notebook computer power management and other battery powered circuits where high-side switching and low in-line power loss are needed in a very small outline surface mount package.

### FEATURES

- $R_{DS(ON)} \leqq 35m\Omega @ V_{GS}=-4.5V$
- $R_{DS(ON)} \leqq 49m\Omega @ V_{GS}=-2.5V$
- $R_{DS(ON)} \leqq 69m\Omega @ V_{GS}=-1.8V$
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability

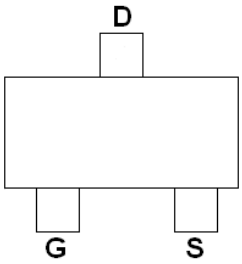
### APPLICATIONS

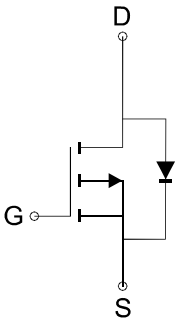
- Power Management in Note book
- Portable Equipment
- Battery Powered System
- DC/DC Converter
- Load Switch
- DSC
- LCD Display inverter

### PIN CONFIGURATION

(SOT-23)

Top View




P-Channel MOSFET

**Ordering Information**: ME2333 (Pb-free)

ME2333 -G (Green product-Halogen free)

### Absolute Maximum Ratings ($T_A$=25℃ Unless Otherwise Noted)

| Parameter | | Symbol | Maximum Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | $T_A$=25℃ | $I_D$ | -5.1 | A |
| | $T_A$=70℃ | | -4.1 | |
| Pulsed Drain Current | | $I_{DM}$ | -21 | A |
| Maximum Power Dissipation | $T_A$=25℃ | $P_D$ | 1.39 | W |
| | $T_A$=70℃ | | 0.89 | |
| Junction and Storage Temperature Range | | TJ, Tstg | -55 to 150 | ℃ |
| Thermal Resistance-Junction to Ambient* | | $R_{\theta JA}$ | 90 | ℃/W |

*The device mounted on 1in$^2$ FR4 board with 2 oz copper

## P-Channel 20V (D-S) MOSFET

**Electrical Characteristics** ($T_J$=25℃ Unless Otherwise Specified)

| Symbol | Parameter | Limit | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=-250μA | -20 | | | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -0.3 | | -1 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{DS}$=0V, $V_{GS}$=±12V | | | ±100 | nA |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-20V, $V_{GS}$=0V | | | -1 | μA |
| $R_{DS(ON)}$ | Drain-Source On-Resistance | $V_{GS}$=-4.5V, $I_D$= -4.5A | | 27 | 35 | mΩ |
| | | $V_{GS}$=-2.5V, $I_D$= -2.5A | | 35 | 49 | |
| | | $V_{GS}$=-1.8V, $I_D$= -2A | | 49 | 69 | |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=-1A, $V_{GS}$=0V | | -0.62 | -1 | V |
| **DYNAMIC** | | | | | | |
| Qg | Total Gate Charge | $V_{DS}$=-10V, $V_{GS}$=-4.5V, $I_D$=-8A | | 12.6 | | nC |
| Qgs | Gate-Source Charge | | | 2.9 | | |
| Qgd | Gate-Drain Charge | | | 4 | | |
| Ciss | Input Capacitance | $V_{DS}$=-10V, $V_{GS}$=0V,f=1MHz | | 1050 | | pF |
| Coss | Output Capacitance | | | 122 | | |
| Crss | Reverse Transfer Capacitance | | | 120 | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=-10V, $R_L$=10Ω<br>$R_{GEN}$=3Ω, $V_{GS}$=-4.5V | | 56.3 | | ns |
| $t_r$ | Turn-On Rise Time | | | 31.5 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 86.1 | | |
| $t_f$ | Turn-Off Fall Time | | | 32.7 | | |

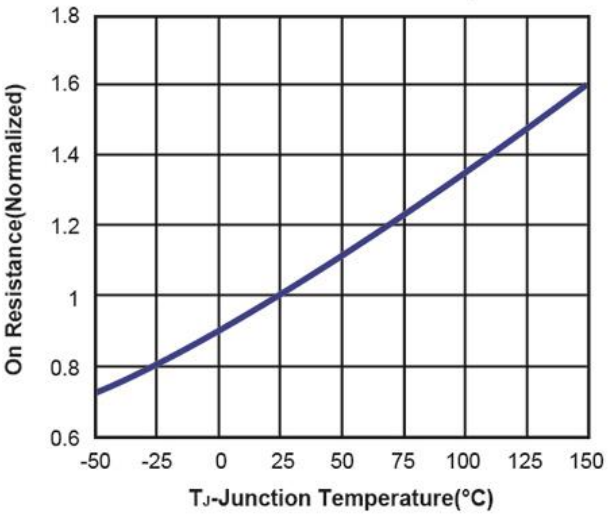
Notes: a. Pulse test; pulse width ≦ 300us, duty cycle≦ 2%

b. Matsuki Electric/ Force mos reserves the right to improve product design, functions and reliability without notice.

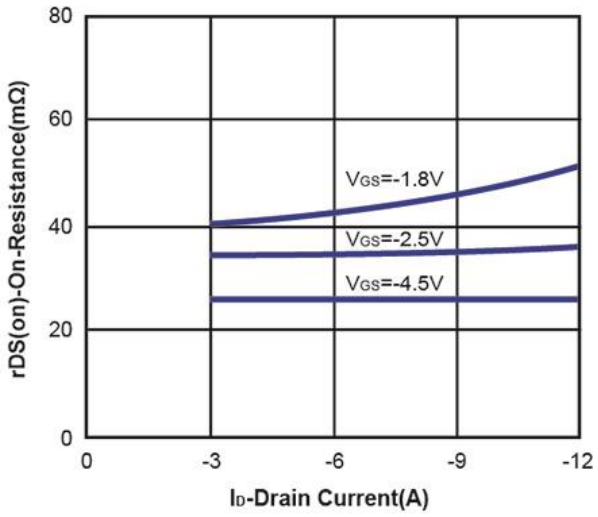
## P-Channel 20V (D-S) MOSFET

### Typical Characteristics ($T_J$ =25℃ Noted)

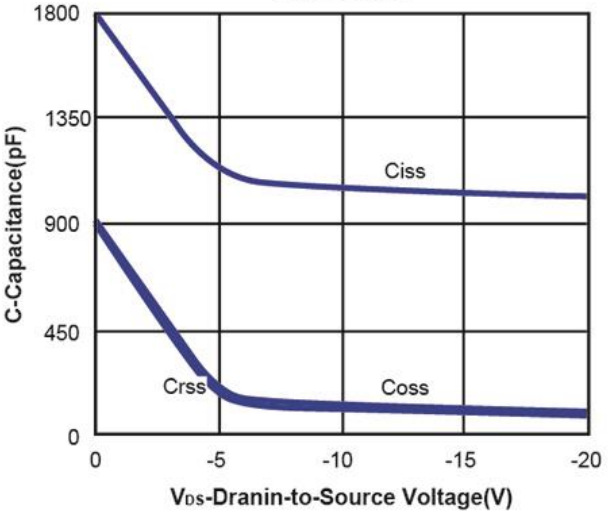
On Resistance vs. Junction Temperature



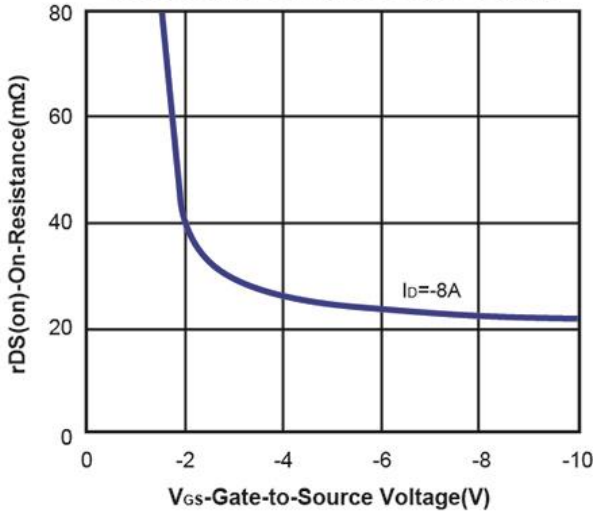

On Resistance vs. Drain Current



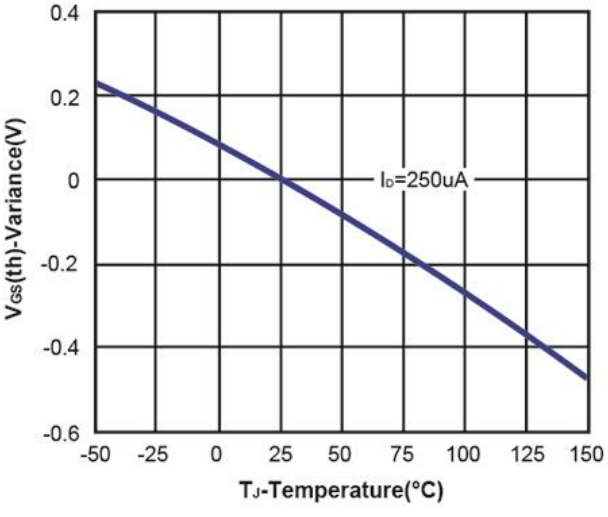

Capacitance



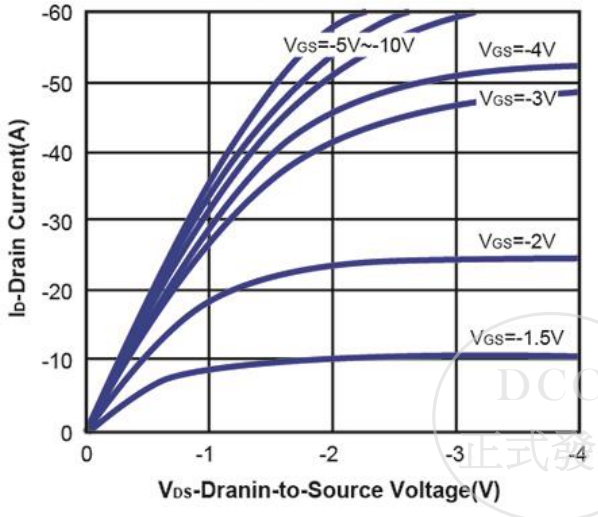

On Resistance vs. Gate-to-Source Voltage




Threshold Voltage



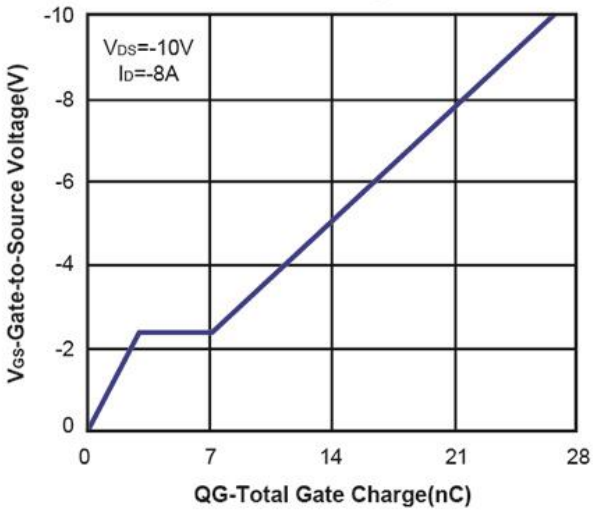

On-Region Characteristics



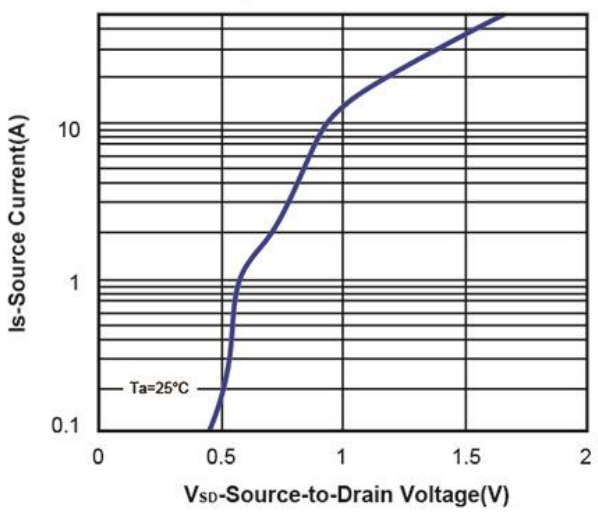
## P-Channel 20V (D-S) MOSFET

### Typical Characteristics ($T_J$ =25℃ Noted)

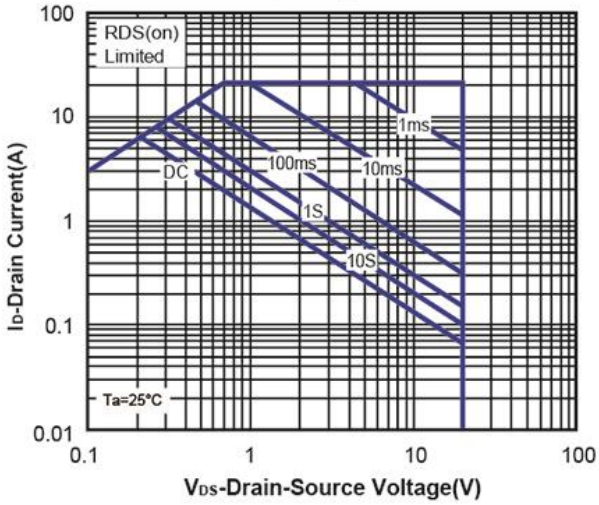
Gate Charge



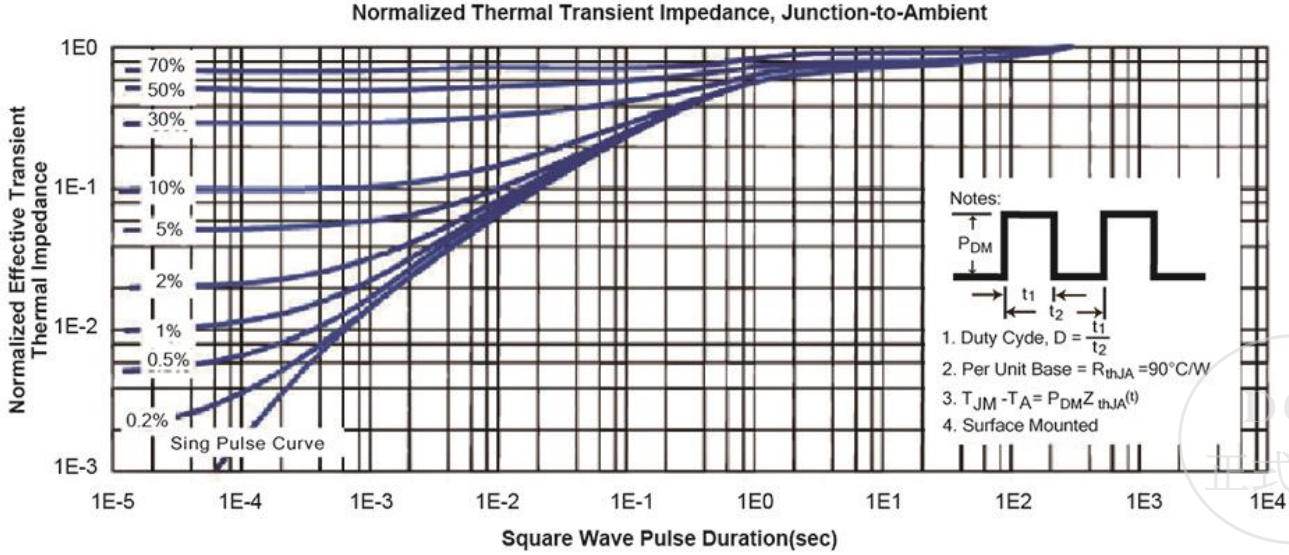

Body-diode characteristics



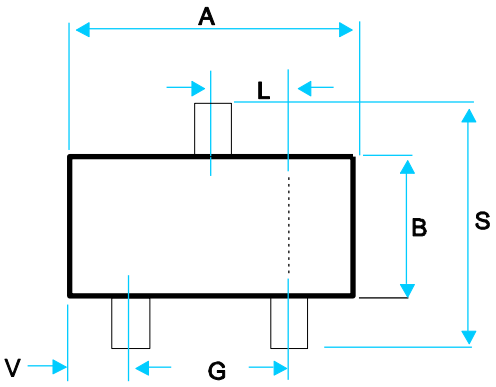

Maximum Forward Biased Safe Operating Area

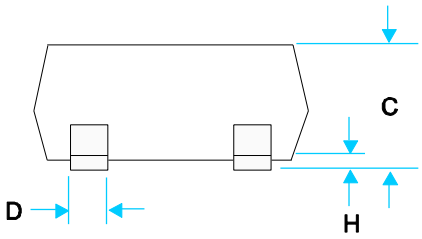


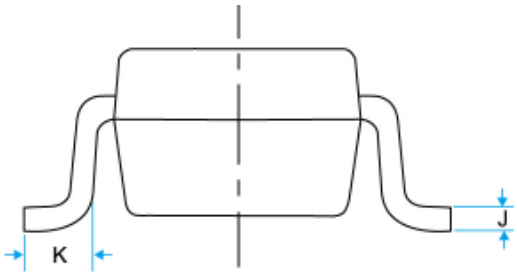

Normalized Thermal Transient Impedance, Junction-to-Ambient



# 大 SOT-23 Package Outline




| DIM | MILLIMETERS (mm) | |
|---|---|---|
| | MIN | MAX |
| A | 2.800 | 3.00 |
| B | 1.200 | 1.70 |
| C | 0.900 | 1.30 |
| D | 0.350 | 0.50 |
| G | 1.780 | 2.04 |
| H | 0.010 | 0.15 |
| J | 0.085 | 0.20 |
| K | 0.300 | 0.65 |
| L | 0.890 | 1.02 |
| S | 2.100 | 3.00 |
| V | 0.450 | 0.60 |