## Dual N-Channel 20-V (D-S) MOSFET

### GENERAL DESCRIPTION

The ME6972 Dual N-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

- $R_{DS(ON)} \leqq 26m\Omega @ V_{GS}=4.5V$
- $R_{DS(ON)} \leqq 36m\Omega @ V_{GS}=2.5V$
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability

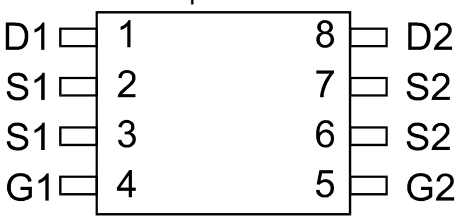
### APPLICATIONS

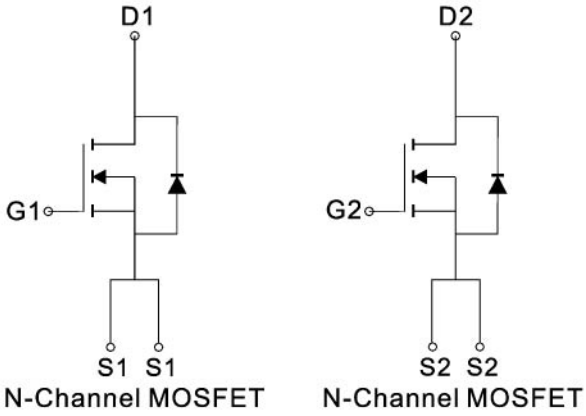
- Power Management in Note book
- Portable Equipment
- Battery Powered System
- Load Switch
- DSC

### PIN CONFIGURATION

(TSSOP-8)

Top View




**Ordering Information**: ME6972 (Pb-free)

ME6972-G (Green product-Halogen free)

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

| Parameter | | Symbol | Maximum | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±12 | V |
| Continuous Drain Current($T_J$=150℃) | $T_A$=25℃ | $I_D$ | 5.5 | A |
| | $T_A$=70℃ | | 4.4 | |
| Pulsed Drain Current | | $I_{DM}$ | 22 | A |
| Maximum Power Dissipation | $T_A$=25℃ | $P_D$ | 1.3 | W |
| | $T_A$=70℃ | | 0.8 | |
| Operating Junction Temperature | | $T_J$ | -55 to 150 | ℃ |
| Thermal Resistance-Junction to Ambient* | | $R_{\theta JA}$ | 100 | ℃/W |

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

## Dual N-Channel 20-V (D-S) MOSFET

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

| Symbol | Parameter | Limit | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| $BV_{DSS}$ | 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 | 0.4 | | 0.9 | 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-State Resistance [a] | $V_{GS}$=4.5V, $I_D$= 6.0A | | 20 | 26 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$= 5.2A | | 28 | 36 | |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=1.7A, $V_{GS}$=0V | | 0.7 | 1.2 | V |
| **DYNAMIC** | | | | | | |
| Qg | Total Gate Charge | $V_{DS}$=10V, $V_{GS}$=4.5V, $I_D$=6.0A | | 8 | | |
| Qgs | Gate-Source Charge | | | 2.1 | | |
| Qgd | Gate-Drain Charge | | | 2.3 | | |
| Ciss | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V,f=1MHz | | 530 | | pF |
| Coss | Output Capacitance | | | 73 | | |
| Crss | Reverse Transfer Capacitance | | | 23 | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=10V, $R_L$ =10Ω<br>$I_D$=1A, $V_{GEN}$=4.5V<br>$R_G$=6Ω | | 14 | | ns |
| $t_r$ | Turn-On Rise Time | | | 17 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 43 | | |
| $t_f$ | Turn-Off Fall Time | | | 5 | | |

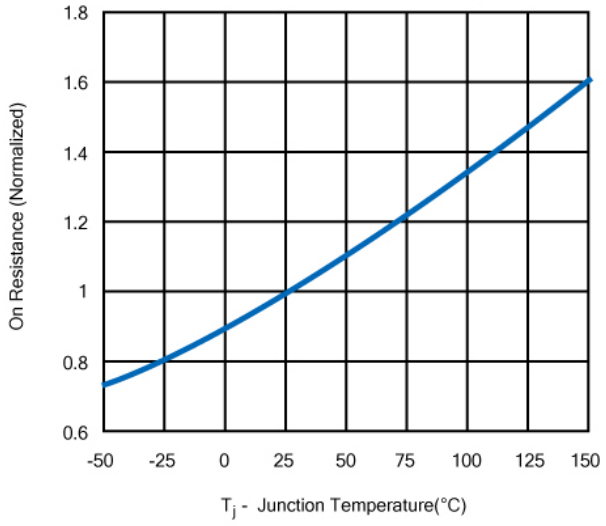
Notes: a. pulse test: pulse width≦ 300us, duty cycle≦ 2%, Guaranteed by design, not subject to production testing.

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

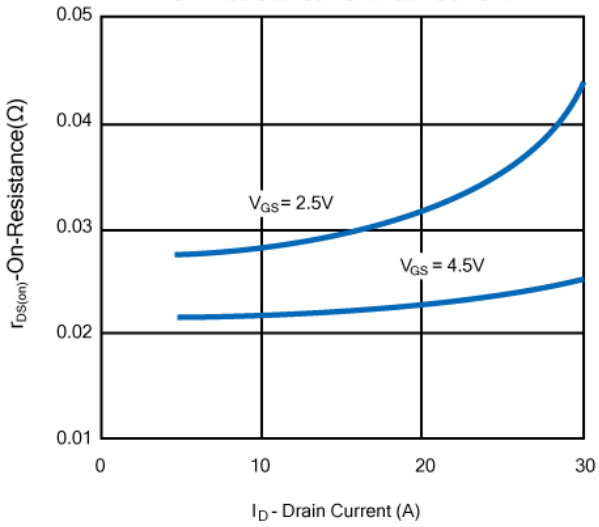
## Dual N-Channel 20-V (D-S) MOSFET

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

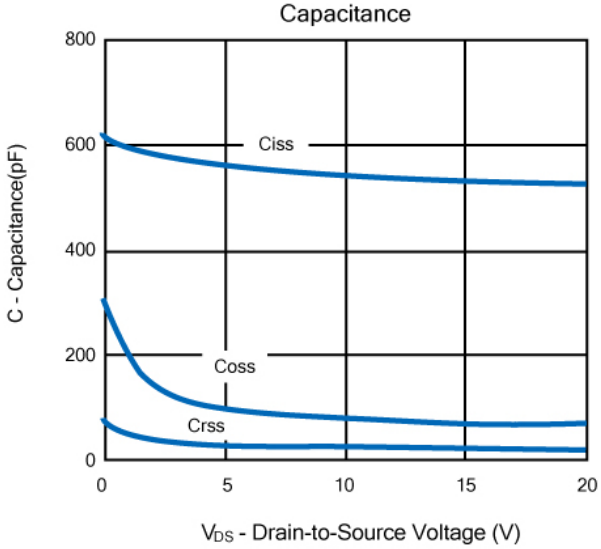
On Resistance vs. Junction Temperature



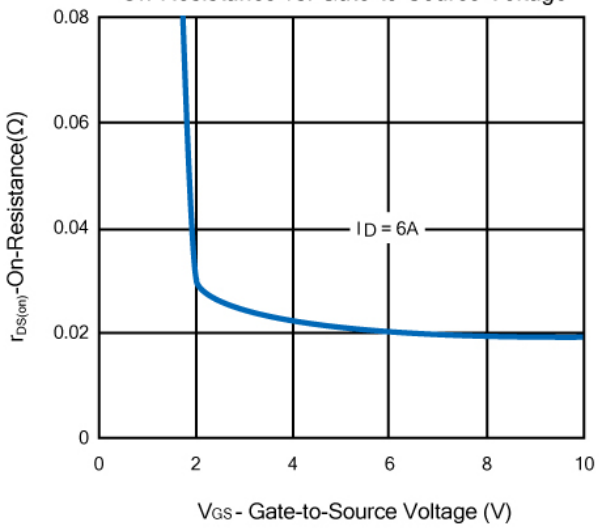

On-Resistance vs. Drain Current



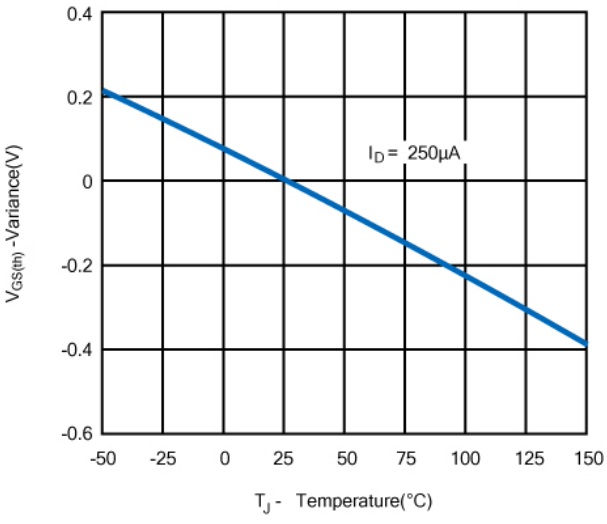

Capacitance



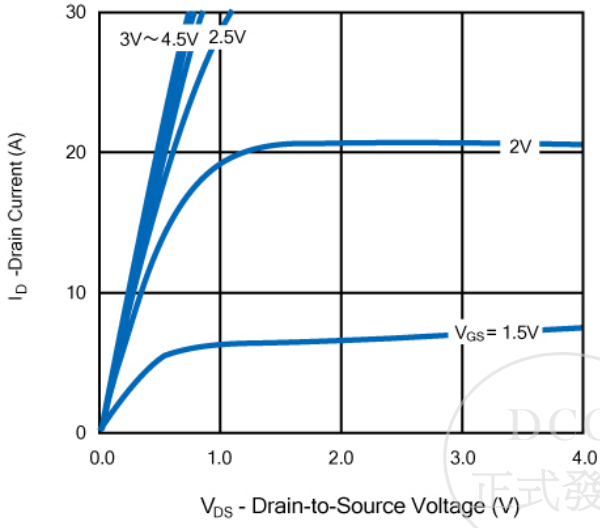

On-Resistance vs. Gate-to-Source Voltage




Threshold Voltage



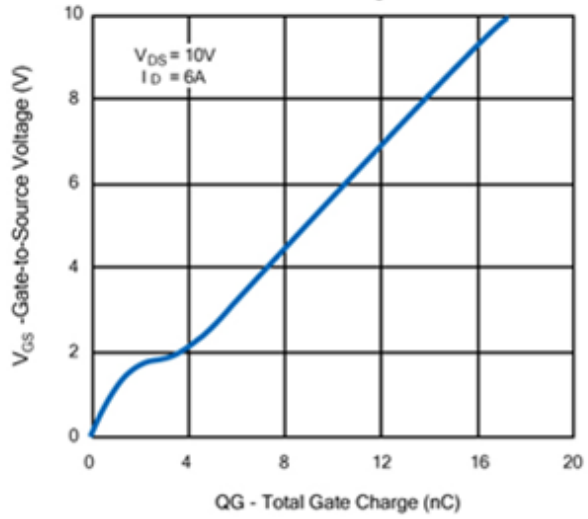

On-Region Characteristics



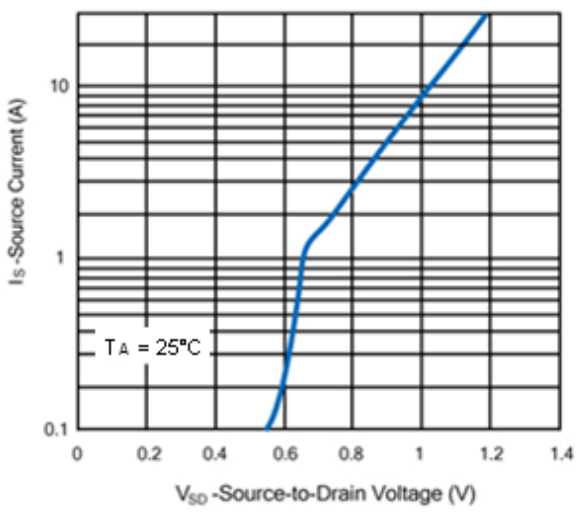
## Dual N-Channel 20-V (D-S) MOSFET

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

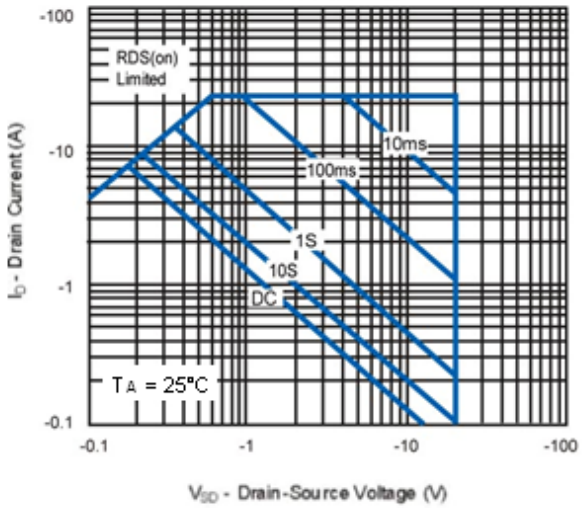
Gate Charge



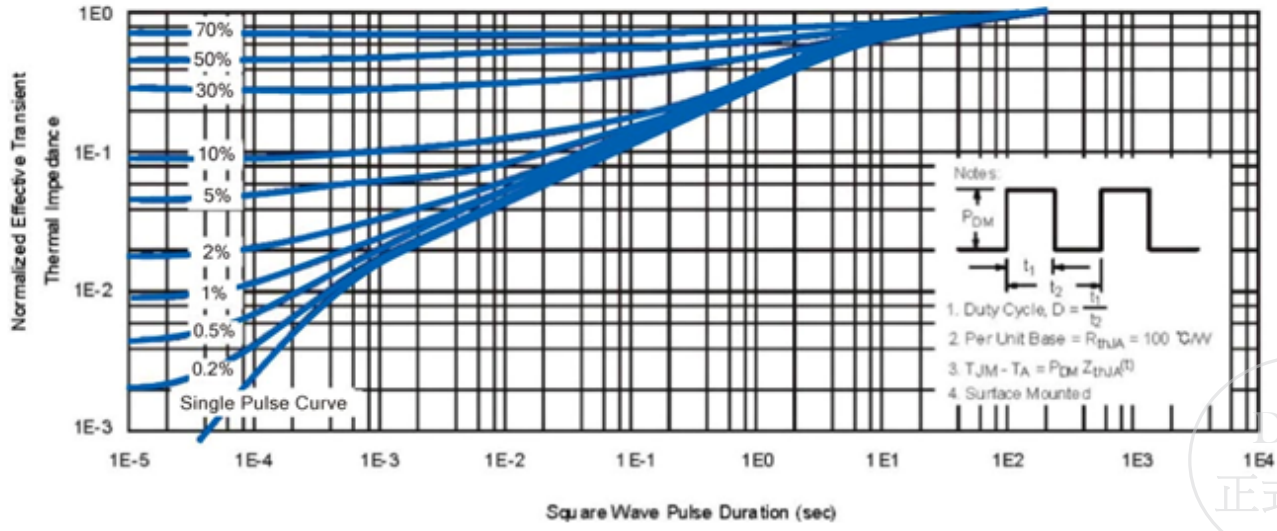

Source to Drain Diode Forward Voltage



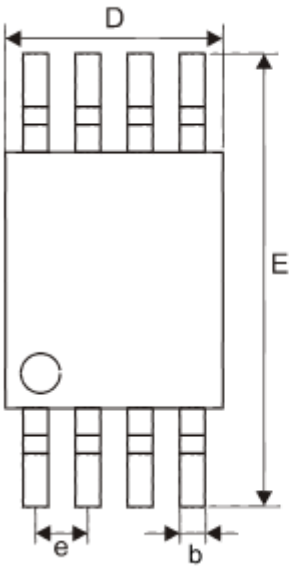

Maximum Forward Biased Safe Operating Area

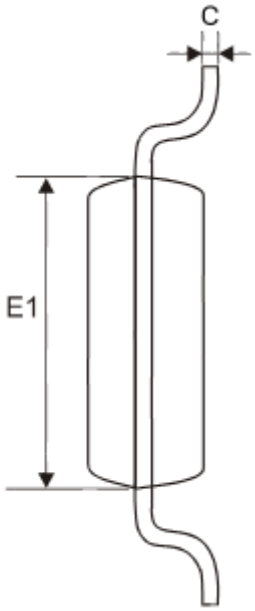


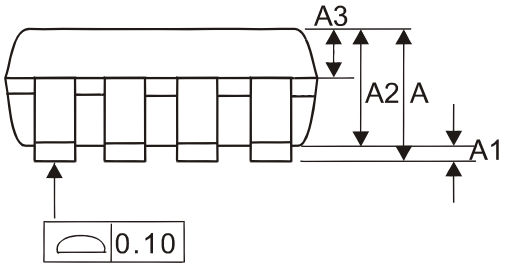

Normalized Thermal Transient Impedance, Junction-to-Ambient

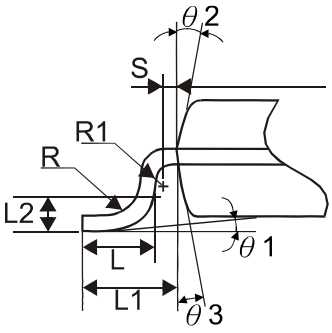


# TSSOP-8 Package




| SYMBOL | MILLIMETERS (mm) | |
|---|---|---|
| | MIN | MAX |
| A | - | 1.20 |
| A1 | 0.05 | 0.15 |
| A2 | 0.90 | 1.05 |
| A3 | 0.34 | 0.54 |
| b | 0.19 | 0.30 |
| c | 0.09 | 0.20 |
| D | 2.90 | 3.10 |
| E | 6.20 | 6.60 |
| E1 | 4.30 | 4.50 |
| e | 0.65BSC | |
| L | 0.45 | 0.75 |
| L1 | 1.00REF | |
| L2 | 0.25BSC | |
| R | 0.09 | - |