## N-Channel 30V(D-S) Enhancement MOSFET

### GENERAL DESCRIPTION

The ME7644 is the 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 notebook computer power management and other battery powered circuits where Low-side switching , and low in-line power loss are needed in a very small outline surface mount package.

### FEATURES

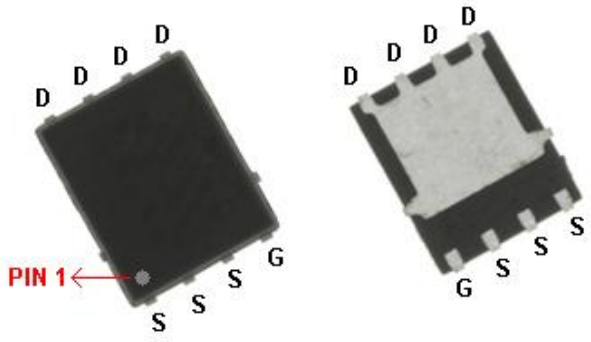
- $R_{DS(ON)} \leqq 0.87m\Omega @ V_{GS}=10V$
- $R_{DS(ON)} \leqq 1.89m\Omega @ V_{GS}=4.5V$
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability

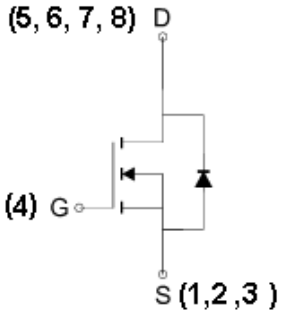
### APPLICATIONS

- UPS
- Power Tools
- LED Lighting

### PIN CONFIGURATION

**PowerDFN 5x6**




N-Channel MOSFET

**Ordering Information**: ME7644 (Pb-free)

ME7644-G (Green product-Halogen free)

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

| Parameter | | Symbol | Maximum Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current* | $T_A$=25℃ | ID | 45 | A |
| | $T_A$=70℃ | | 36 | |
| Pulsed Drain Current | | $I_{DM}$ | 179 | A |
| Maximum Power Dissipation* | $T_A$=25℃ | $P_D$ | 2.78 | W |
| | $T_A$=70℃ | | 1.78 | |
| Junction and Storage Temperature Range | | TJ, Tstg | -55 to 150 | ℃ |
| Thermal Resistance-Junction to Ambient* | | $R_{\theta JA}$ | 45 | ℃/W |

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

## N-Channel 30V(D-S) Enhancement 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 | 30 | | | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.2 | | 2.2 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{DS}$=0V, $V_{GS}$=±20V | | | ±100 | nA |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=24V, $V_{GS}$=0V | | | 1 | μA |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance[a] | $V_{GS}$=10V, $I_D$=30A | | 0.72 | 0.87 | mΩ |
| | Drain-Source On-State Resistance[a] | $V_{GS}$=4.5V, $I_D$=30A | | 1.45 | 1.89 | |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=10A, $V_{GS}$=0V | | 0.73 | 1.1 | V |
| **DYNAMIC** | | | | | | |
| Qg | Total Gate Charge | $V_{DS}$=15V, $V_{GS}$=10V, $I_D$=30A | | 209 | | nC |
| Qg | Total Gate Charge | $V_{DS}$=15V, $V_{GS}$=4.5V, $I_D$=30A | | 106 | | |
| Qgs | Gate-Source Charge | | | 40.1 | | |
| Qgd | Gate-Drain Charge | | | 51.1 | | |
| Ciss | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V,F=1MHz | | 11727 | | pF |
| Coss | Output Capacitance | | | 1549 | | |
| Crss | Reverse Transfer Capacitance | | | 1457 | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=15V, $R_L$=15Ω<br>$I_D$=1A, $V_{GEN}$=4.5V<br>$R_G$=3Ω | | 79.6 | | ns |
| $t_r$ | Turn-On Rise Time | | | 75.5 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 141 | | |
| $t_f$ | Turn-Off Fall Time | | | 68.6 | | |

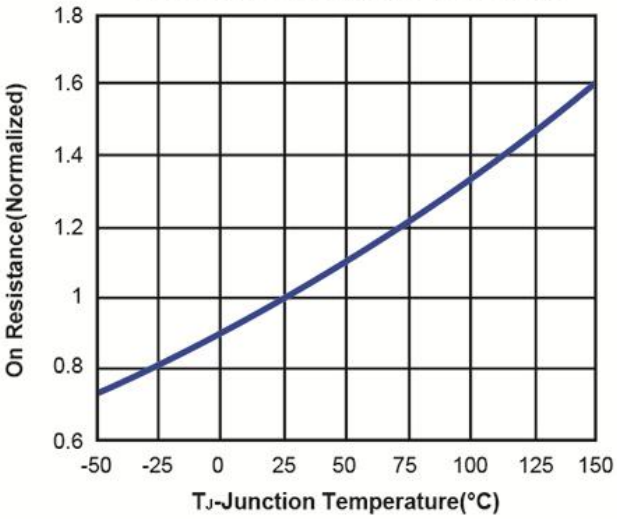
Note: a.Pulse test: pulse width≦300us, duty cycle≦2%

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

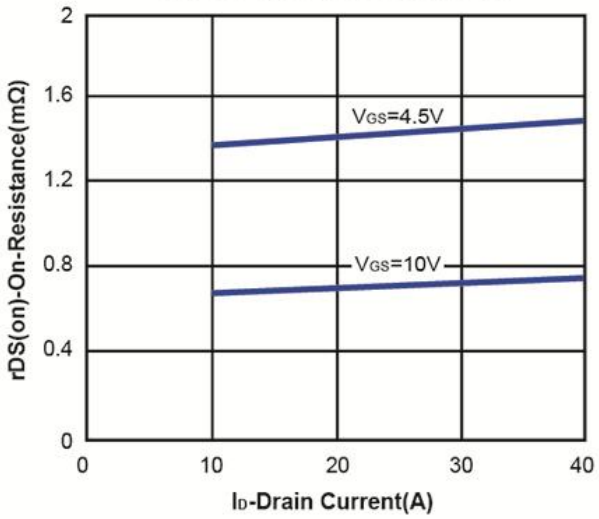
## N-Channel 30V(D-S) Enhancement MOSFET

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

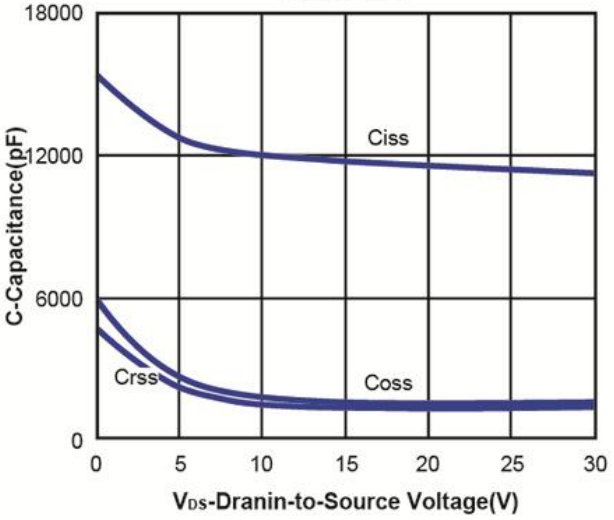
On Resistance vs. Junction Temperature



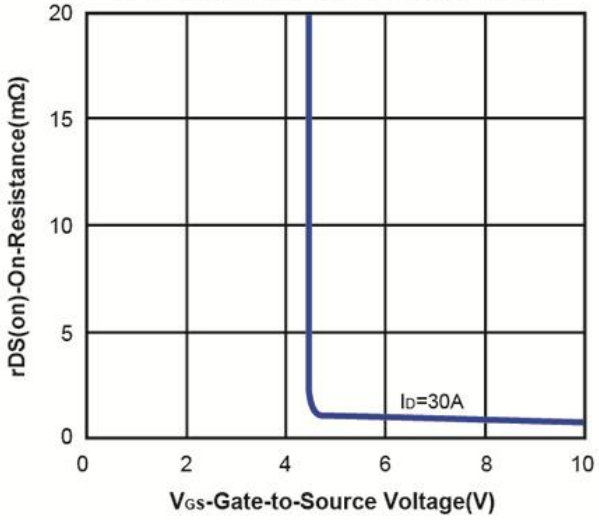

On Resistance vs. Drain Current



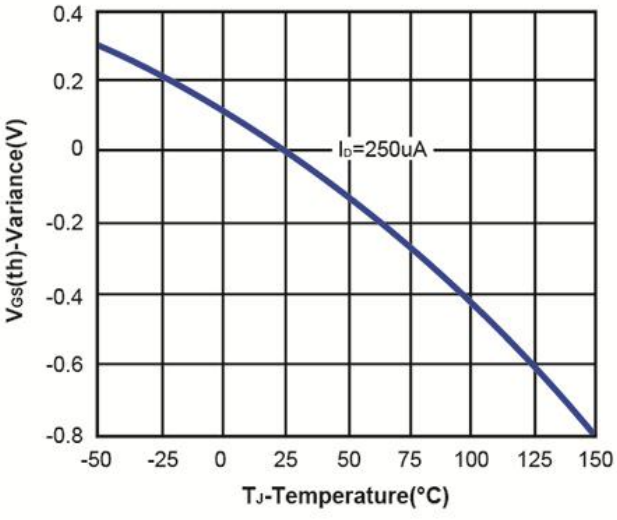

Capacitance



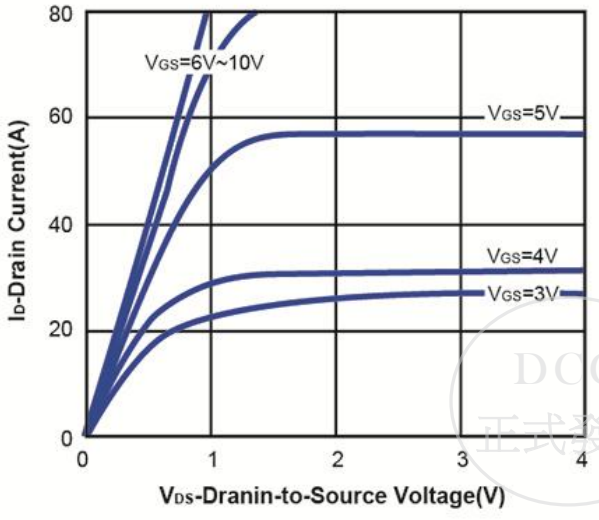

On Resistance vs. Gate-to-Source Voltage




Threshold Voltage



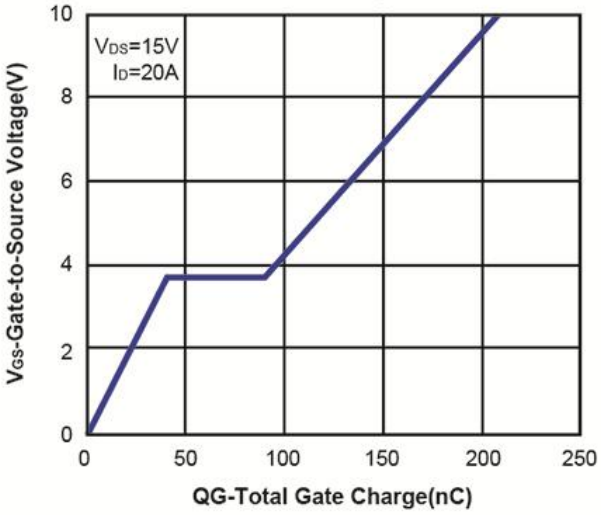

On-Region Characteristics



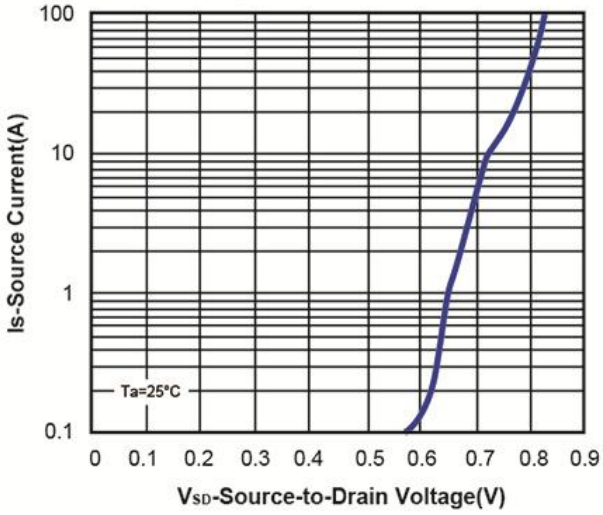
## N-Channel 30V(D-S) Enhancement MOSFET

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

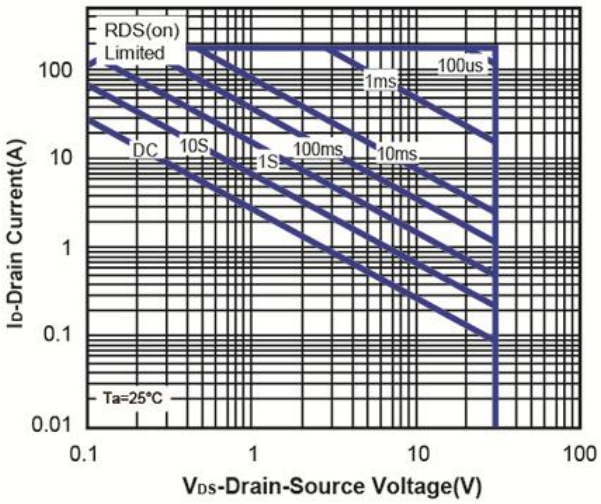
Gate Charge



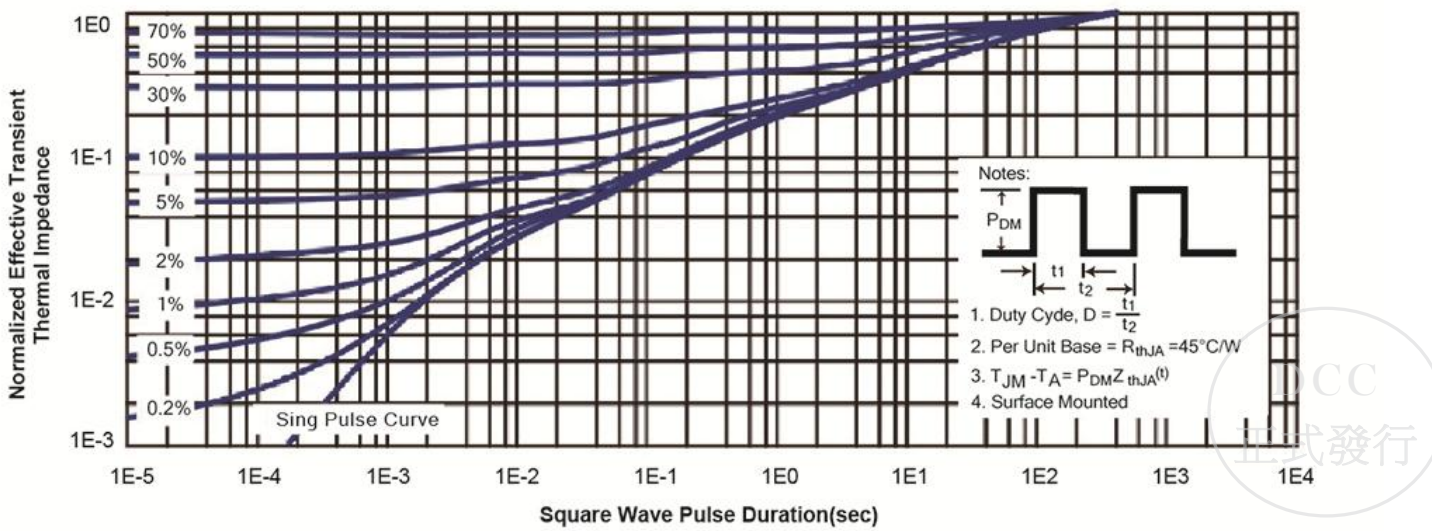

Body-diode characteristics



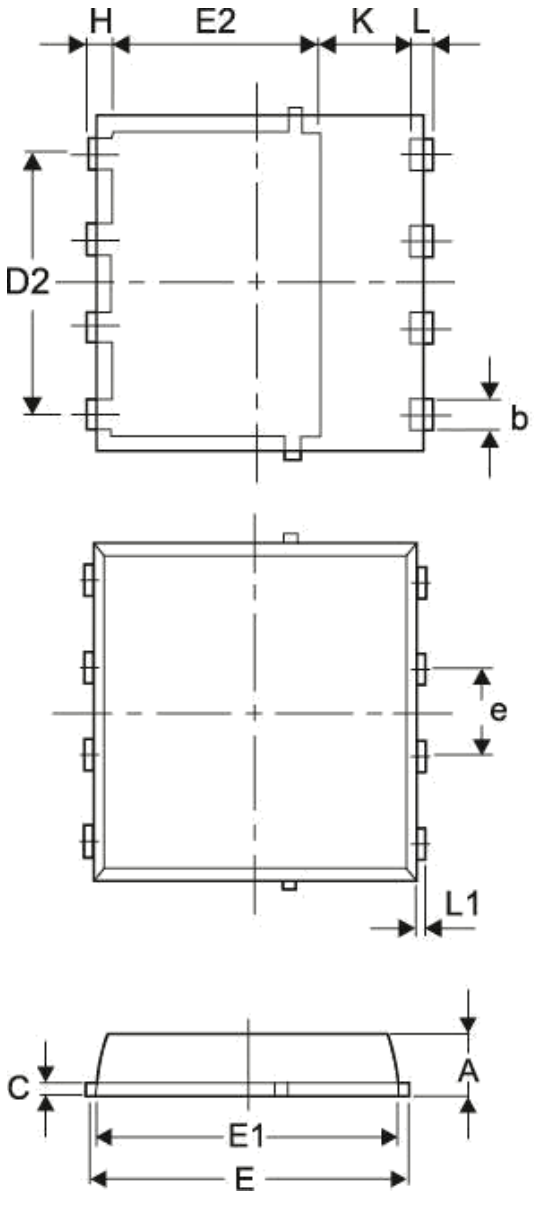

Maximum Forward Biased Safe Operating Area

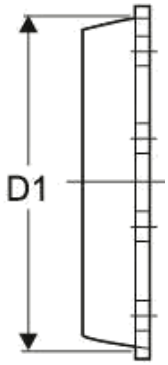



Normalized Thermal Transient Impedance, Junction-to-Ambient



## PowerDFN 5x6 Package Outline




| Symbol | MILLIMETERS (mm) | |
|---|---|---|
| | MIN | MAX |
| A | 0.90 | 1.25 |
| b | 0.33 | 0.51 |
| C | 0.155 | 0.30 |
| D1 | 4.80 | 5.00 |
| D2 | 3.61 | 3.96 |
| E | 5.8 | 6.20 |
| E1 | 5.6 | 5.90 |
| E2 | 3.35 | 4.31 |
| e | 1.27 BSC | |
| H | 0.35 | 0.61 |
| K | 1.60 | - |
| L | 0.35 | 0.71 |
| L1 | 0.05 | 0.20 |