# ACE7438M

**N-Channel 30-V MOSFET**

## Description

The ACE7438M uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. This device is suitable for use as a high side switch in SMPS and general purpose applications.

## Features

- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

## Applications

- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

## Absolute Maximum Ratings

| Parameter | | Symbol | Limit | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current [a] | $T_A$=25°C | $I_D$ | 22 | A |
| | $T_A$=70°C | | 18 | |
| Pulse Drain Current [b] | | $I_{DM}$ | 80 | |
| Continuous Drain Current (Diode Continuous) [a] | | $I_S$ | 5.1 | A |
| Power Dissipation [a] | $T_A$=25°C | $P_D$ | 5 | W |
| | $T_A$=70°C | | 3.2 | |
| Operating Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55 to 150 | °C |

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Maximum Junction-to-Ambient [a] | t≦10sec | $R_{\theta JA}$ | 25 | ℃/W |
| | Steady State | | 65 | ℃/W |

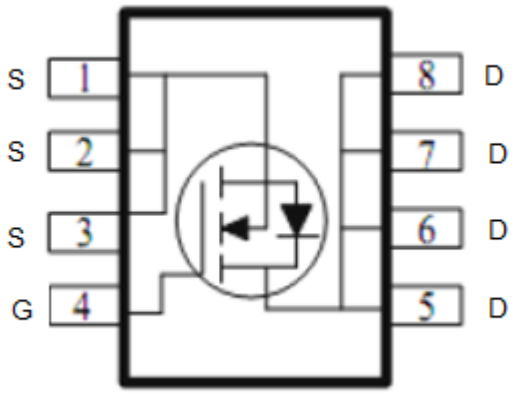
Notes

a. Surface Mounted on 1” x 1” FR4 Board.

b. Pulse width limited by maximum junction temperature

## Packaging Type

DFN5*6-8L




## Ordering information

ACE7438M PN + H

- Halogen - free
- Pb - free
- PN : DFN5*6-8L

**Electrical Characteristics** $T_A$=25 °C unless otherwise noted

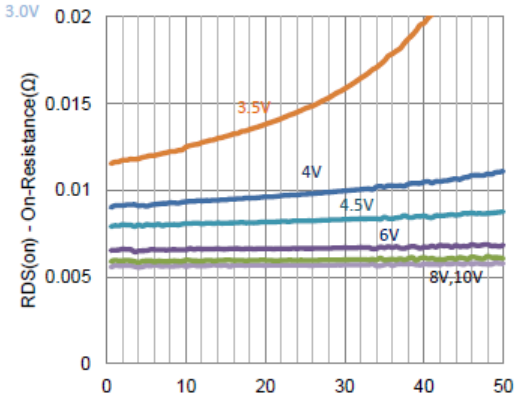
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Static | | | | | | |
| Gate Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 1 | | | V |
| Gate Body Leakage | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=24V, $V_{GS}$=0V | | | 1 | uA |
| | | $V_{DS}$=24V, $V_{GS}$=0V, $T_J$=55℃ | | | 25 | |
| On-State Drain-Current [a] | $I_{D(on)}$ | $V_{DS}$=5V, $V_{GS}$=10V | 40 | | | A |
| Static Drain-Source On-Resistance [a] | $r_{DS(ON)}$ | $V_{GS}$=10V,$I_D$=15.2 A | | | 7.5 | mΩ |
| | | $V_{GS}$= 4.5 V,$I_D$= 14.4 A | | | 11.5 | |
| Forward Transconductance [a] | $g_{fS}$ | $V_{GS}$=15V,$I_D$=15.2 A | | 30 | | S |
| Diode Forward Voltage [a] | $V_{SD}$ | $I_S$= 2.6 A ,$V_{GS}$=0V | | 0.72 | | V |
| Dynamic [b] | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$V_{GS}$=4.5V , $I_D$=15.2A | | 21 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 8.0 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 9.2 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$=15V, ,$R_L$=1Ω $I_D$=15.2A,$V_{GEN}$=10V $R_{GEN}$=6Ω, | | 4 | | ns |
| Rise Time | $t_f$ | | | 58 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 54 | | |
| Fall Time | $t_f$ | | | 31 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=15V, $V_{GS}$=0V f=1MHz | | 1835 | | pF |
| Output Capacitance | $C_{oss}$ | | | 315 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 303 | | |

Note:

a. Pulse test: PW <= 300us duty cycle <= 2%.

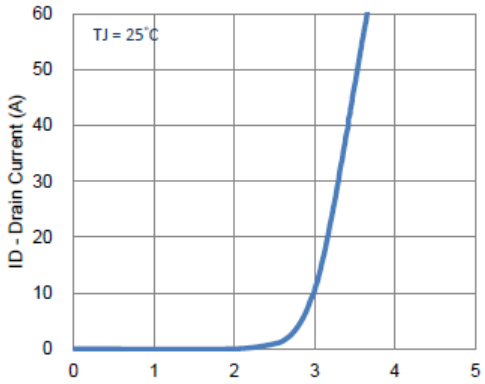
b. Guaranteed by design, not subject to production testing.

## Typical Performance Characteristics



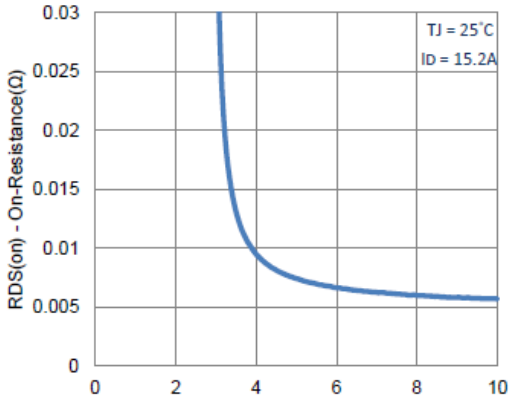

ID-Drain Current (A)

1. On-Resistance vs. Drain Current



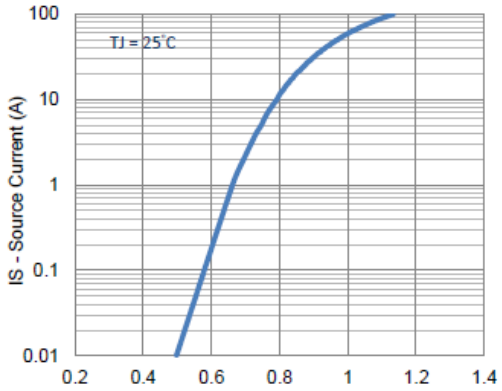

VGS - Gate-to-Source Voltage (V)

2. Transfer Characteristics



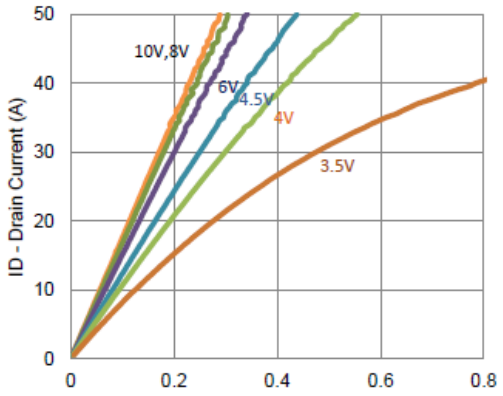

VGS - Gate-to-Source Voltage (V)

3. On-Resistance vs. Gate-to-Source Voltage



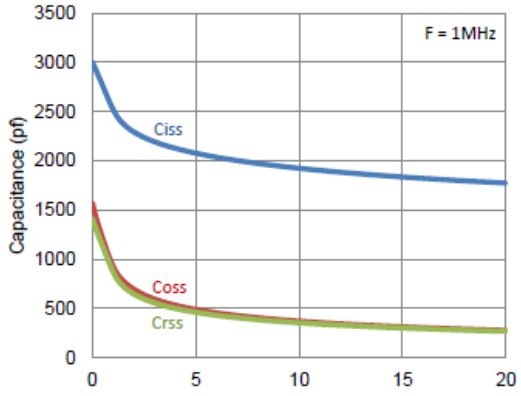

VSD - Source-to-Drain Voltage (V)

4. Drain-to-Source Forward Voltage




VDS - Drain-to-Source Voltage (V)

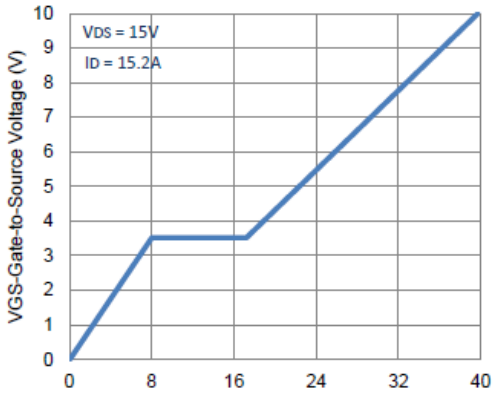
5. Output Characteristics



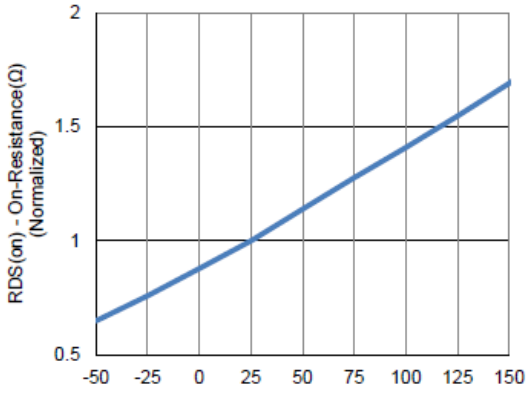

VDS-Drain-to-Source Voltage (V)

6. Capacitance

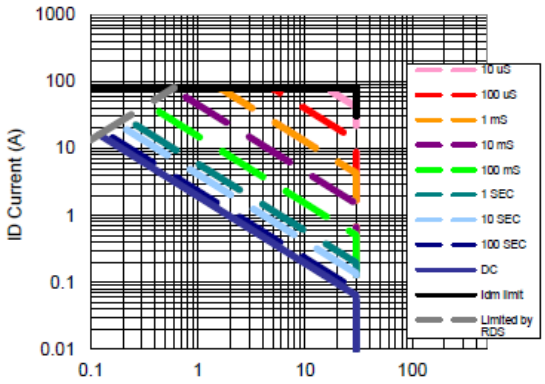
## Typical Performance Characteristics



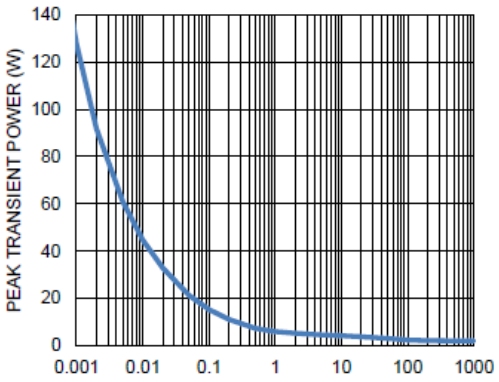

Qg - Total Gate Charge (nC)
7. Gate Charge



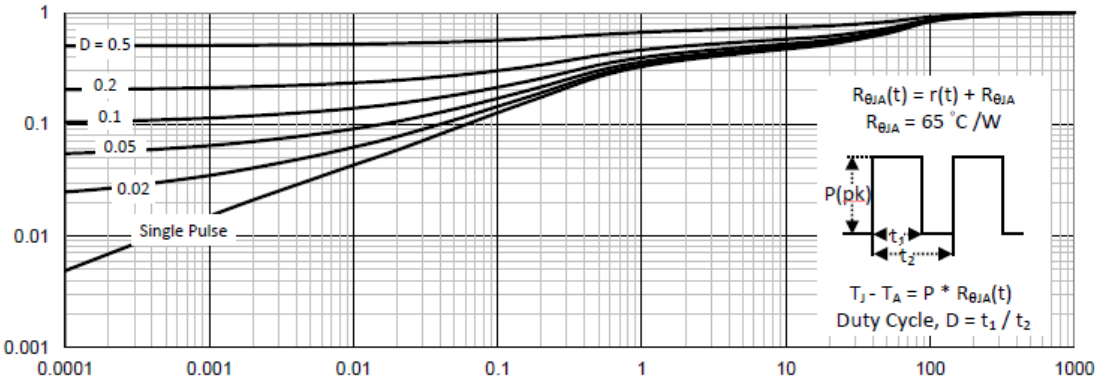

TJ -JunctionTemperature(°C)
8. Normalized On-Resistance Vs Junction Temperature




VDS Drain to Source Voltage (V)
9. Safe Operating Area



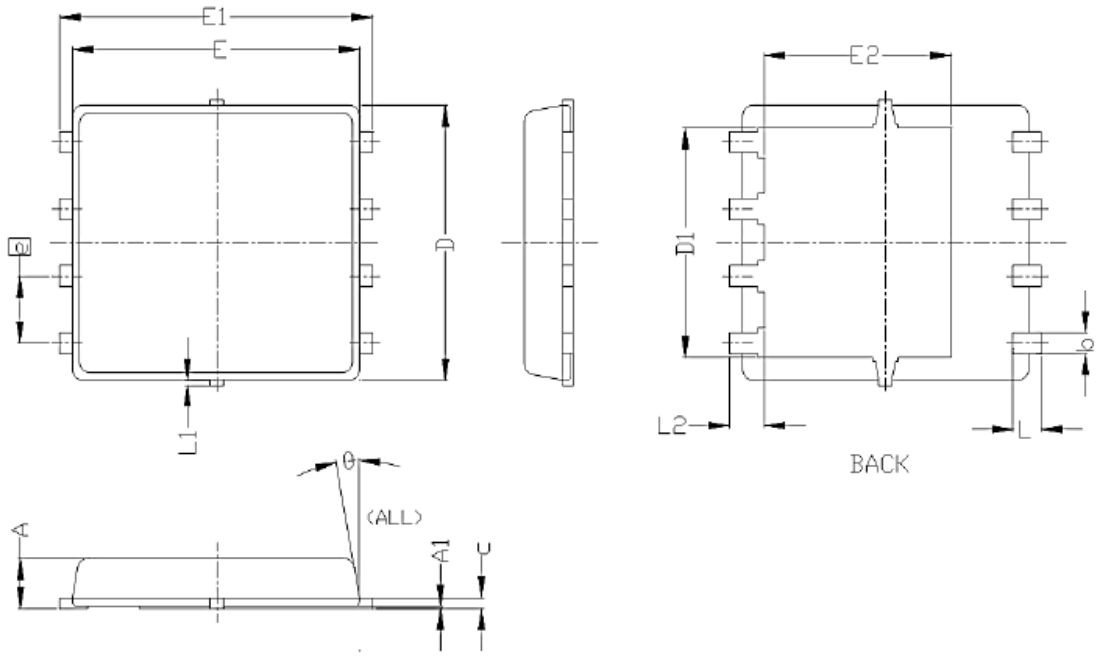

t1 TIME (SEC)
10. Single Pulse Maximum Power Dissipation




t1 TIME (sec)
11. Normalized Thermal Transient Junction to Ambient

## Packing Information

**DFN5*6-8L**




| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIENSIONS IN INCHES | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.85 | 0.95 | 1.00 | 0.033 | 0.037 | 0.039 |
| A1 | 0.00 | | 0.05 | 0.000 | | 0.002 |
| b | 0.30 | 0.40 | 0.50 | 0.012 | 0.016 | 0.020 |
| c | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| D | 5.20 BSC | | | 0.205 BSC | | |
| D1 | 4.35 BSC | | | 0.171 BSC | | |
| E | 5.55 BSC | | | 0.219 BSC | | |
| E1 | 6.05 BSC | | | 0.238 BSC | | |
| E2 | 3.62 BSC | | | 0.143 BSC | | |
| e | 1.27 BSC | | | 0.050 BSC | | |
| L | 0.45 | 0.55 | 0.65 | 0.018 | 0.022 | 0.026 |
| L1 | 0 | | 0.15 | 0 | | 0.006 |
| L2 | 0.68 REF | | | 0.027 REF | | |
| θ | 0° | | 10° | 0° | | 10° |

Notes

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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