# ACE12322A

**Dual N-Channel Enhancement Mode MOSFET**

## Description

The ACE12322A is the 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 notebook computer power management and other battery powered circuits where high-side switching, low in-line power loss and resistance to transients are needed.

## Features

- 20V/4.0A,$R_{DS(ON)}$=26mΩ@VGS=4.5V
- 20V/3.0A,$R_{DS(ON)}$=35mΩ@VGS=2.5V
- 20V/2.0A,$R_{DS(ON)}$=50mΩ@VGS=1.8V
- Super high density cell design for extremely low $R_{DS\ (ON)}$
- Exceptional on-resistance and maximum DC current capability
- DFN2X2-6L package design

## Applications

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

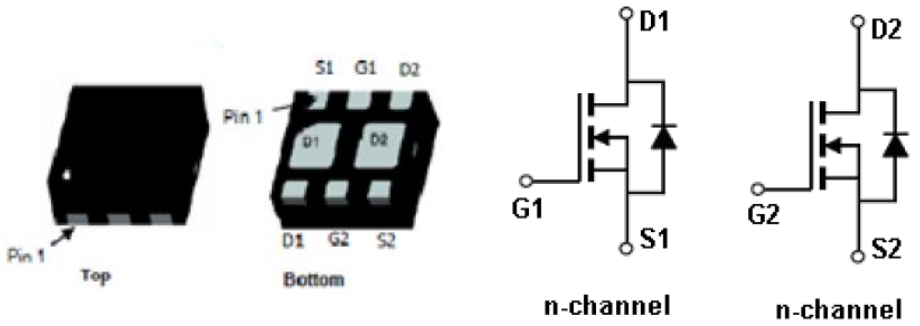
## Absolute Maximum Ratings

($T_A$=25℃ Unless otherwise noted)

| Parameter | | Symbol | Typical | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±12 | V |
| Continuous Drain Current ($T_J$=150℃) | $T_A$=25℃ | $I_D$ | 4.5 | A |
| | $T_A$=70℃ | | 4.5 | |
| Pulsed Drain Current | | $I_{DM}$ | 20 | A |
| Continuous Source Current(Diode Conduction) | | $I_S$ | 1.6 | A |
| Power Dissipation | $T_A$=25℃ | $P_D$ | 1.9 | W |
| | $T_A$=70℃ | | 1.2 | |
| Operating Junction Temperature | | $T_J$ | -55~150 | °C |
| Storage Temperature Range | | $T_{STG}$ | -55~150 | °C |
| Thermal Resistance-Junction to Ambient | T≦5sec | $R_{\theta JA}$ | 65 | °C /W |
| | Steady State | | 95 | |

## Packaging Type

DFN2*2-6L




## Pin Description

| Pin | Symbol | Description |
|---|---|---|
| 1 | S1 | Source 1 |
| 2 | G1 | Gate 1 |
| 3 | D2 | Drain 2 |
| 4 | S2 | Source 2 |
| 5 | G2 | Gate 2 |
| 6 | D1 | Drain 1 |
| Exposed Backside Metal | D1/D2 | Drain |

## Ordering information

ACE12322A XX + H

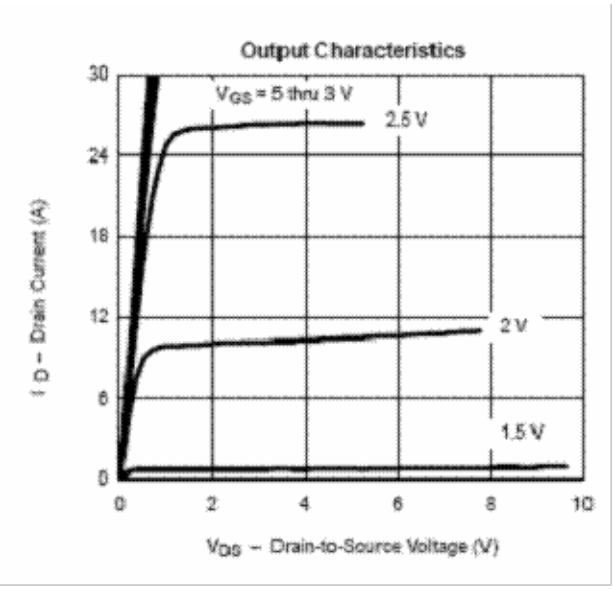
- Halogen - free
- Pb - free
- MN: DFN2*2-6L

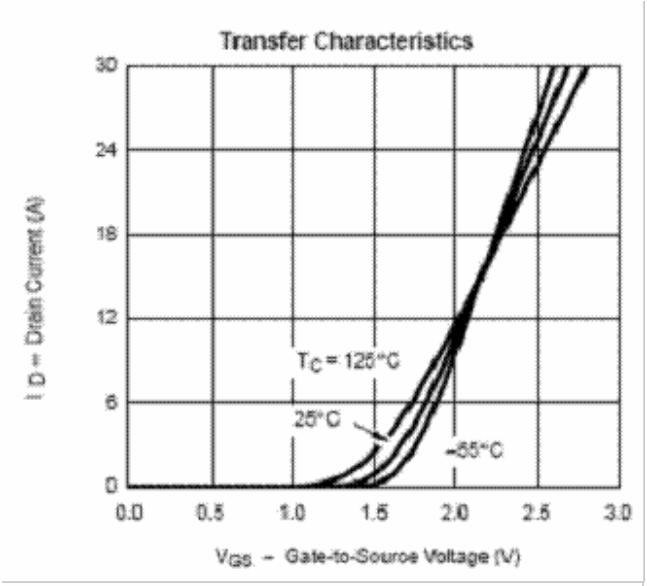
## Electrical Characteristics

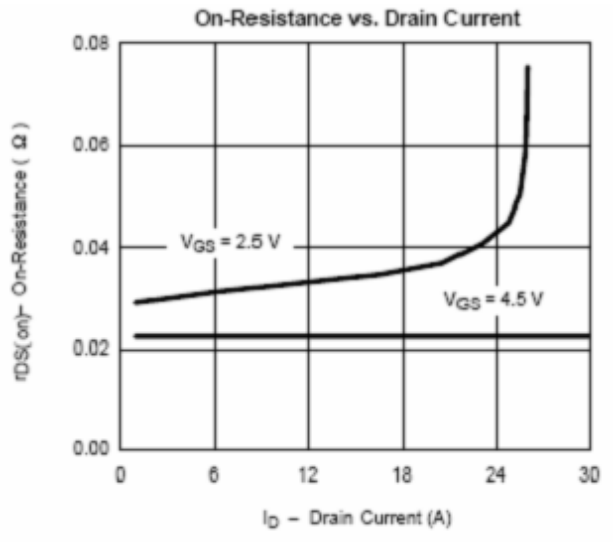
$T_A$=25℃, unless otherwise noted.

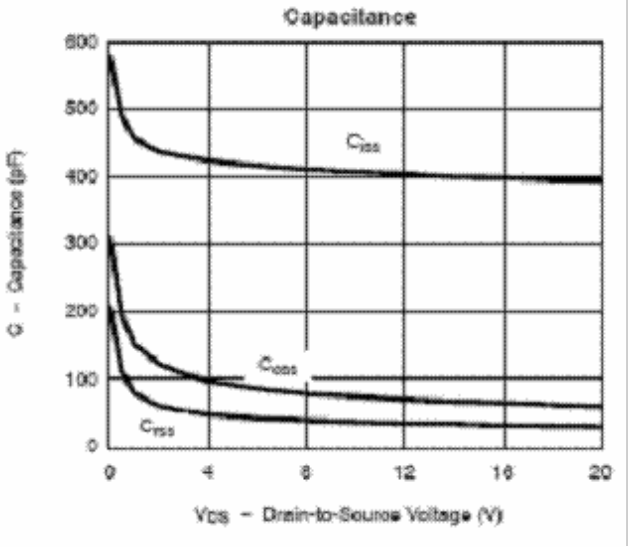
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250uA | 20 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 0.4 | | 1.0 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{DS}$=0V,$V_{GS}$=±12V | | | ±100 | uA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$=0V | | | 1 | uA |
| | | $V_{DS}$=20V, $V_{GS}$=0V, $T_J$=55℃ | | | 10 | |
| On-State Drain Current | $I_{D(on)}$ | $V_{DS}$≦4.5V,$V_{GS}$=5V | 15 | | | A |
| Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=4.0A | | | 26 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=3.0A | | | 35 | |
| | | $V_{GS}$=1.8V, $I_D$=2.0A | | | 50 | |
| Forward Trans Conductance | gfs | $V_{DS}$=5V, $I_D$=-3.5A | | 10 | | S |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=1A | | | 1.0 | V |
| Dynamic | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V, $V_{GS}$=4.5V, $I_D$≡4.0A | | 8.6 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.37 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 2.3 | | |
| Input Capacitance | Ciss | $V_{DS}$ = 8V, f = 1MHz, $V_{GS}$ = 0V | | 575 | | pF |
| Output Capacitance | Coss | | | 84 | | |
| Reverse Transfer Capacitance | Crss | | | 22 | | |
| Turn-On Time | td(on) | $V_{DD}$=10V, $I_D$≡3.0A, $R_G$=3.3Ω, $V_{GEN}$=4.5V | | 5.2 | | ns |
| | tr | | | 34 | | |
| Turn-Off Time | td(off) | | | 23 | | |
| | tf | | | 9.2 | | |

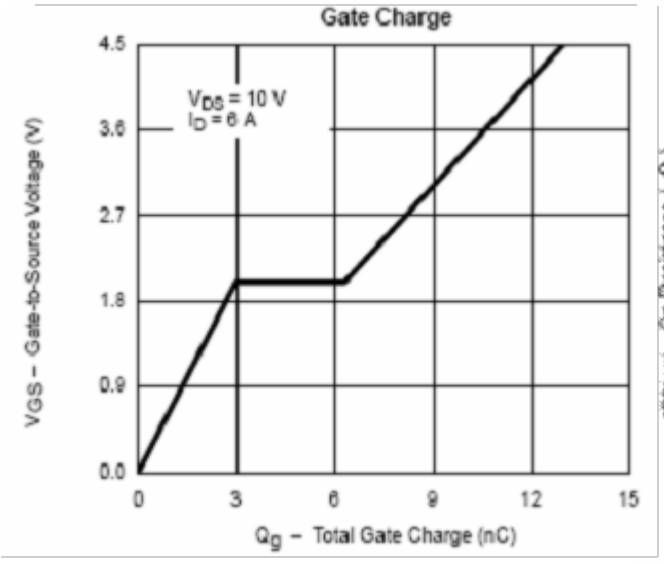
## Typical Performance Characteristics

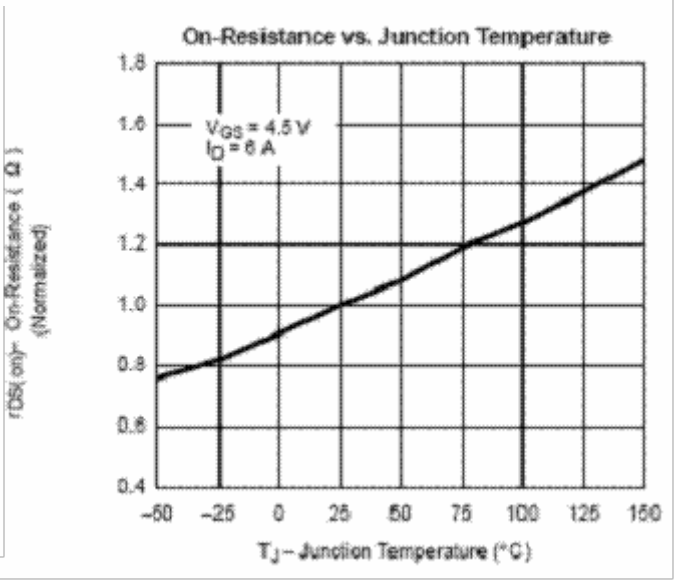


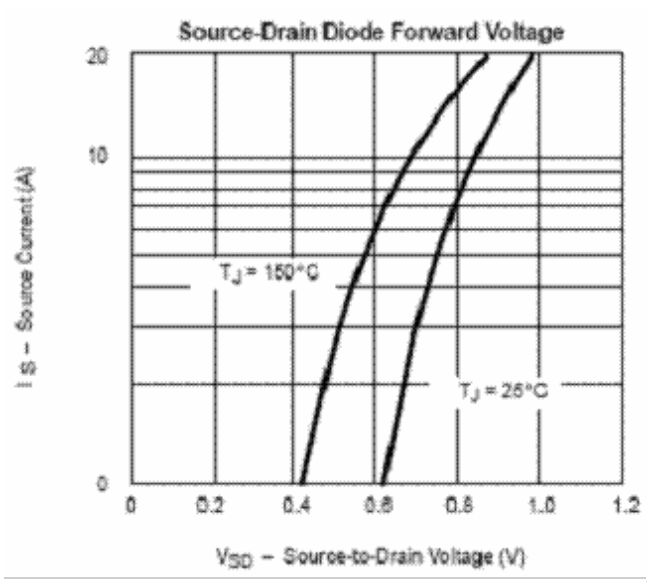



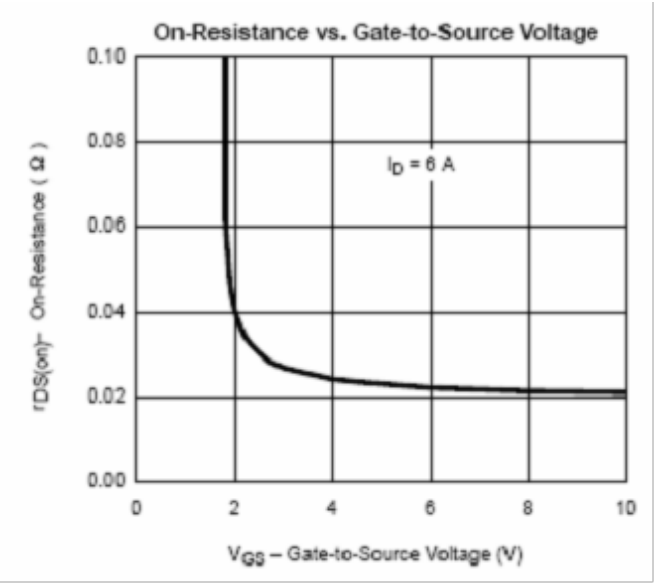



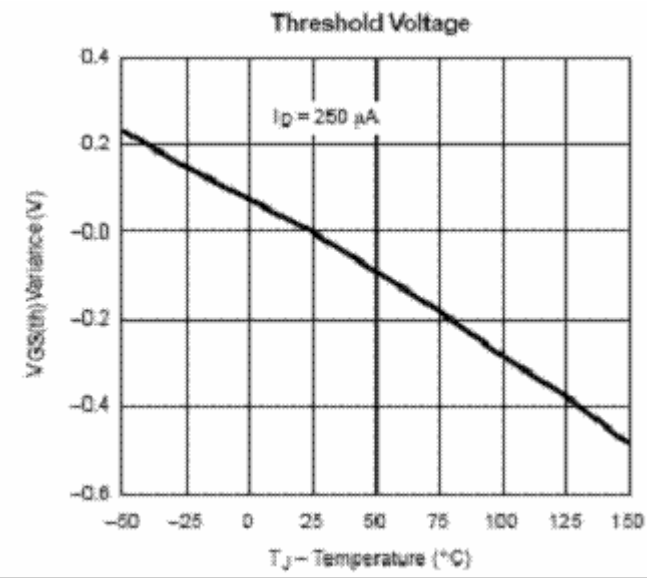



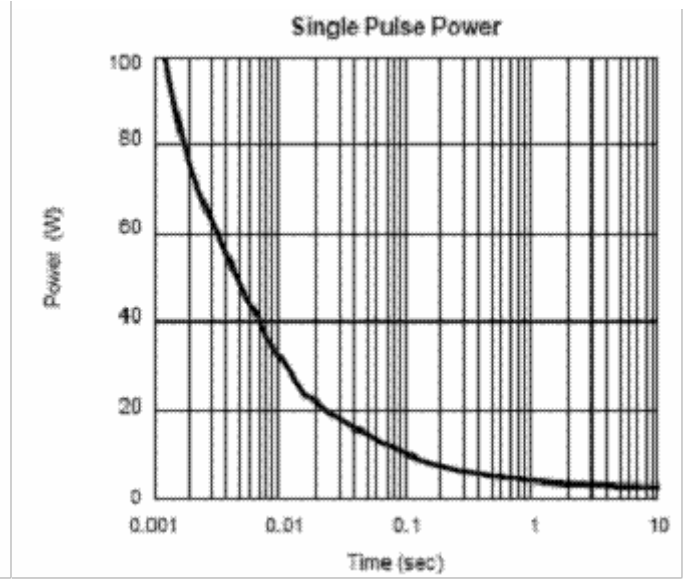



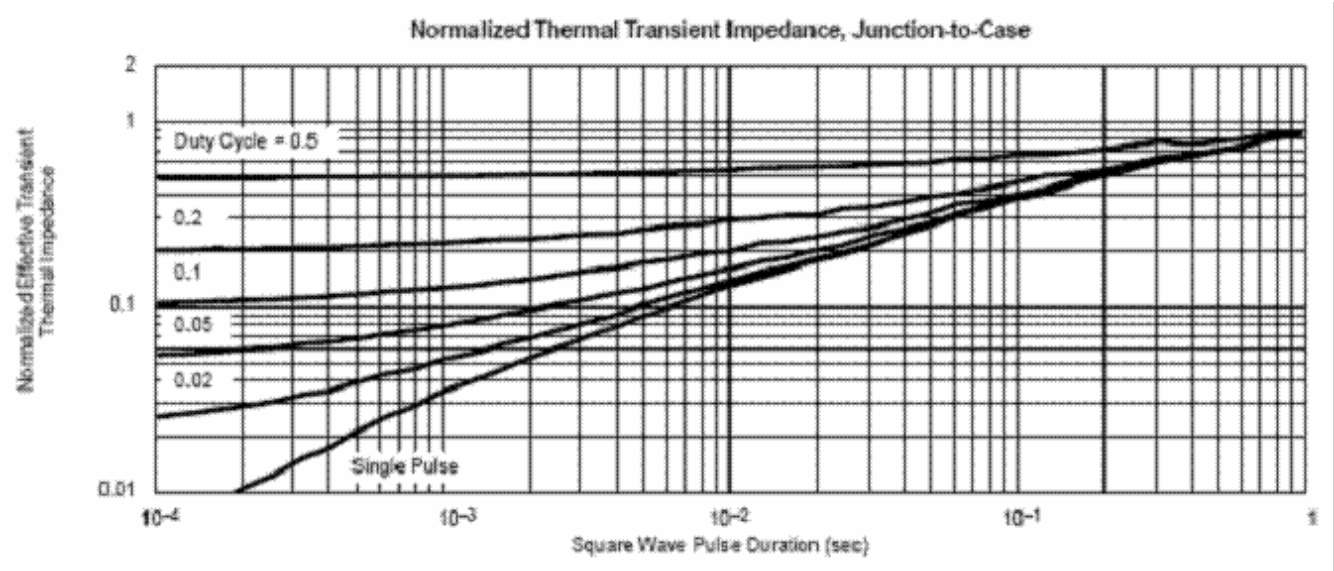




Source-Drain Diode Forward Voltage
I S – Source Current (A)
20
10
0
$T_J$ = 150°C
$T_J$ = 25°C
0
0.2
0.4
0.6
0.8
1.0
1.2
$V_{SD}$ – Source-to-Drain Voltage (V)


On-Resistance vs. Gate-to-Source Voltage
$r_{DS(on)}$ – On-Resistance (Ω)
0.10
0.08
0.06
0.04
0.02
0.00
$I_D$ = 6 A
0
2
4
6
8
10
$V_{GS}$ – Gate-to-Source Voltage (V)

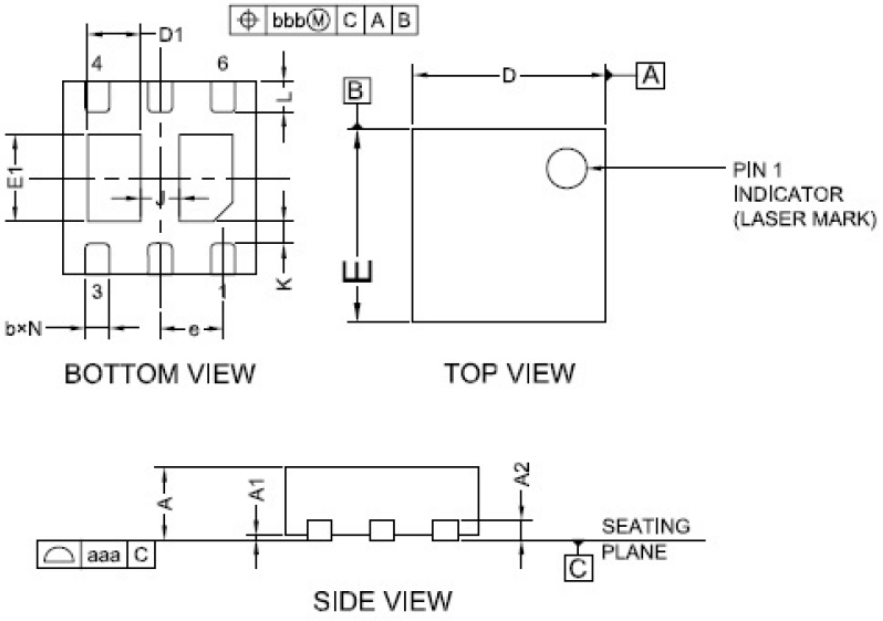

Threshold Voltage
V GS(th) Variance (V)
0.4
0.2
-0.0
-0.2
-0.4
-0.6
$I_D$ = 250 µA
-50
-25
0
25
50
75
100
125
150
$T_J$ – Temperature (°C)


Single Pulse Power
Power (W)
100
80
60
40
20
0
0.001
0.01
0.1
1
10
Time (sec)


Normalized Thermal Transient Impedance, Junction-to-Case
Normalized Effective Transient Thermal Impedance
2
1
0.1
0.01
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse
$10^{-4}$
$10^{-3}$
$10^{-2}$
$10^{-1}$
1
Square Wave Pulse Duration (sec)

## Packing Information

### DFN2*2-6L




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| Symbol | Min | Typ | Max |
|---|---|---|---|
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | 0.02 | 0.05 |
| A2 | | 0.203 | |
| b | 0.20 | 0.25 | 0.30 |
| D | 1.95 | 2.00 | 2.05 |
| D1 | 0.50 | 0.55 | 0.60 |
| E | 1.95 | 2.00 | 2.05 |
| E1 | 0.85 | 0.90 | 0.95 |
| e | | 0.65BSC | |
| L | 0.27 | 0.32 | 0.37 |
| J | | 0.40BSC | |
| K | | 0.20MIN | |
| N | | 6 | |
| aaa | | 0.08 | |
| bbb | | 0.10 | |

Notes

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