N-Channel Depletion-Mode MOSFET

Ordering Information

BV_{DSX} / BV_{DGX}	$R_{DS(ON)}$ (max)	I_{DSS} (min)	Order Number / Package		
			TO-92	**TO-243AA***	**Die**
500V	1.0KΩ	1.0mA	LND150N3	LND150N8	LND150ND

* Same as SOT-89. Product shipped on 2000 piece carrier tape reels.

Product marking for TO-243AA:

LN1E✳

Where ✳ = 2-week alpha date code

Features

❏ ESD gate protection

❏ Free from secondary breakdown

❏ Low power drive requirement

❏ Ease of paralleling

❏ Excellent thermal stability

❏ Integral source-drain diode

❏ High input impedance and low C_{ISS}

Applications

❏ Solid state relays

❏ Normally-on switches

❏ Converters

❏ Power supply circuits

❏ Constant current sources

❏ Input protection circuits

Absolute Maximum Ratings

|	
Drain-to-Source Voltage	BV_{DSX}
Drain-to-Gate Voltage	BV_{DGX}
Gate-to-Source Voltage	±20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

* Distance of 1.6 mm from case for 10 seconds.

Advanced DMOS Technology

The LND1 is a high voltage N-channel depletion mode (normally-on) transistor utilizing Supertex's lateral DMOS technology. The gate is ESD protected.

The LND1 is ideal for high voltage applications in the areas of normally-on switches, precision constant current sources, voltage ramp generation and amplification.

Package Options

TO-243AA
(SOT-89)

TO-92

Note: See Package Outline section for dimensions.
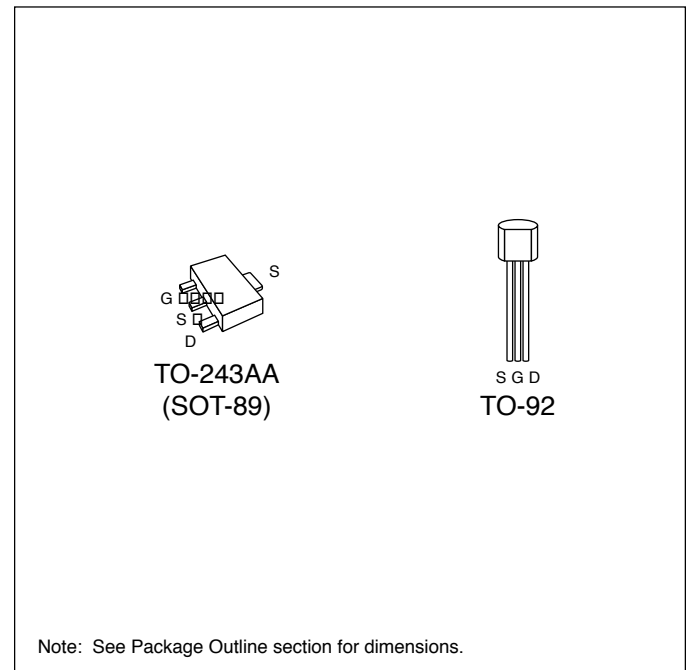
Thermal Characteristics

Package	I_D (continuous)*	I_D (pulsed)	Power Dissipation @T_A = 25°C	θ_{jc} °C/W	θ_{ja} °C/W	I_{DR}	I_{DRM}*
TO-92	30mA	30mA	0.74W	125	170	30mA	30mA
TO-243AA	30mA	30mA	1.6W†	31	105†	30mA	30mA

* I_D (continuous) is limited by max rated T_f.
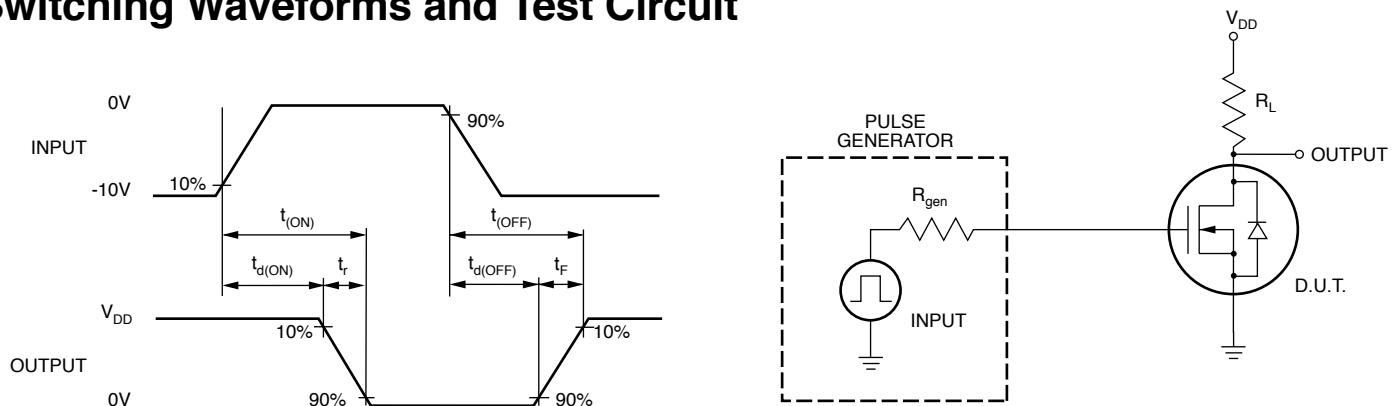† Mounted on FR5 Board, 25mm x 25mm x 1.57mm. Significant P_D increase possible on ceramic substrate.

Electrical Characteristics (@ 25°C unless otherwise specified)

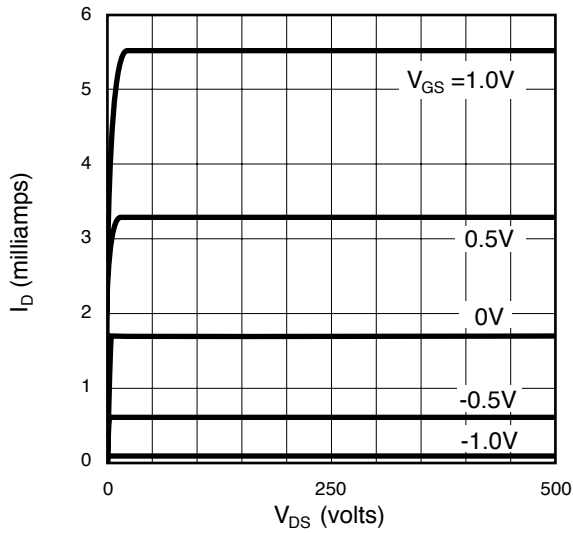| Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSX}	Drain-to-Source Breakdown Voltage	500			V	V_{GS} = -10V, I_D = 1.0mA
$V_{GS(OFF)}$	Gate-to-Source OFF Voltage	-1.0		-3.0	V	V_{DS} = 25V, I_D = 100nA
$\Delta V_{GS(OFF)}$	Change in $V_{GS(OFF)}$ with Temperature			5.0	mV/°C	V_{DS} = 25V, I_D = 100nA
I_{GSS}	Gate Body Leakage Current			100	nA	V_{GS} = ±20V, V_{DS} = 0V
$I_{D(OFF)}$	Drain-to-Source Leakage Current			100	nA	V_{GS} = -10V, V_{DS} = 450V
				100	μA	V_{GS} = -10V, V_{DS} = 0.8V max rating T_A =125°C
I_{DSS}	Saturated Drain-to-Source Current	1.0		3.0	mA	V_{GS} = 0V, V_{DS} = 25V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance		850	1000	Ω	V_{GS} = 0V, I_D = 0.5mA
$\Delta R_{DS(ON)}$	Change in RDS(ON) with Temperature			1.2	%/°C	V_{GS} = 0V, I_D = 0.5mA
G_{FS}	Forward Transconductance	1.0	2.0		m℧	V_{GS} = 0V, I_D = 1.0mA
C_{ISS}	Input Capacitance		7.5	10		
C_{OSS}	Output Capacitance		2.0	3.5	pF	V_{GS} = -10V, V_{DS} = 25V f = 1 MHz
C_{RSS}	Reverse Transfer Capacitance		0.5	1.0		
$t_{d(ON)}$	Turn-ON Delay Time		0.09			
tr	Rise Time		0.45			
$t_{d(OFF)}$	Turn-OFF Delay Time		0.1		μs	V_{DD} = 25V, I_D = 1.0mA, R_{GEN} = 25Ω
t_f	Fall Time		1.3			
V_{SD}	Diode Forward Voltage Drop			0.9	V	V_{GS} = -10V, I_{SD} = 1.0mA
t_{rr}	Reverse Recovery Time		200		ns	V_{GS} = -10V, I_{SD} = 1.0mA

Notes:
1. All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300μs pulse, 2% duty cycle.)
2. All A.C. parameters sample tested.
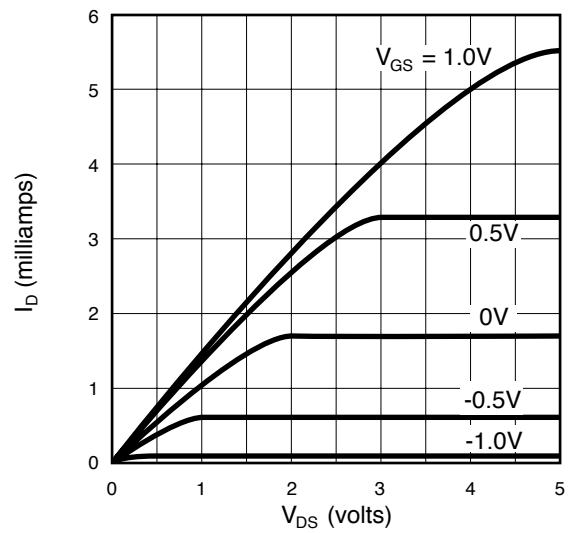
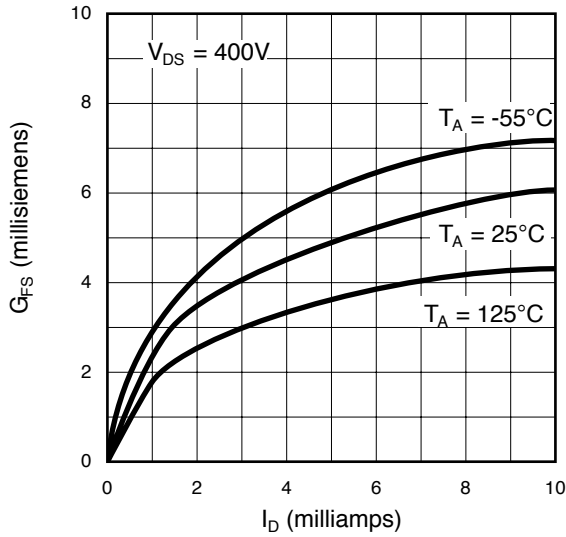## Switching Waveforms and Test Circuit

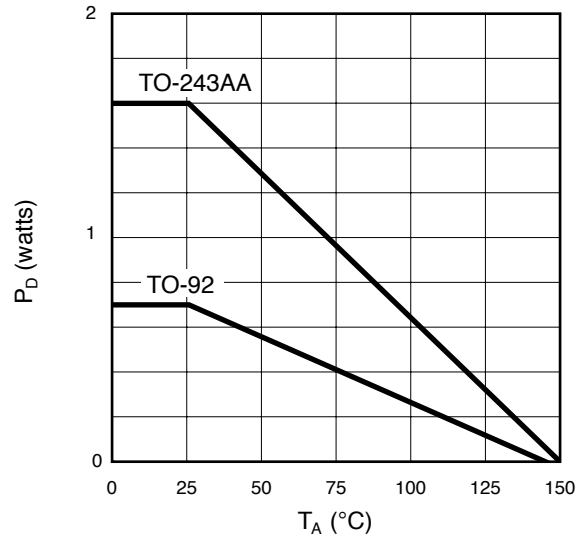# Typical Performance Curves

Output Characteristics

I_D (milliamps) vs V_{DS} (volts)

V_{GS} = 1.0V
0.5V
0V
-0.5V
-1.0V

Saturation Characteristics

I_D (milliamps) vs V_{DS} (volts)

V_{GS} = 1.0V
0.5V
0V
-0.5V
-1.0V

Transconductance vs. Drain Current

G_{FS} (millisiemens) vs I_D (milliamps)

V_{DS} = 400V

T_A = -55°C
T_A = 25°C
T_A = 125°C

Power Dissipation vs. Ambient Temperature

P_D (watts) vs T_A (°C)

TO-243AA
TO-92

Maximum Rated Safe Operating Area

I_D (milliamps) vs V_{DS} (volts)

TO-92 (DC)   TO-92 (pulsed)
TO-243AA (DC)
T_A = 25°C
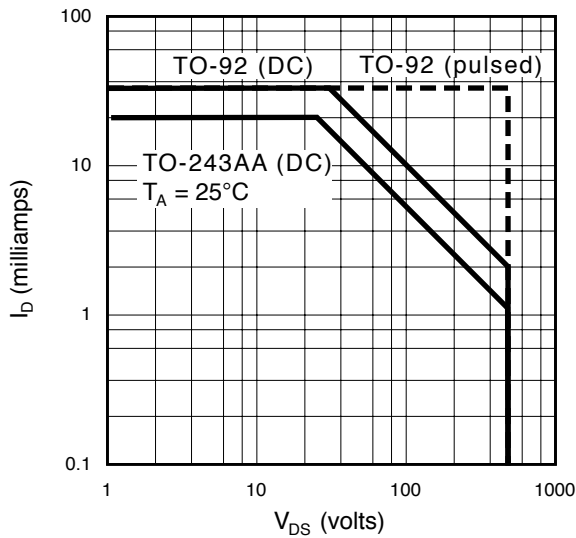
Thermal Response Characteristics

Thermal Resistance (normalized) vs t_P (seconds)

TO-243AA
T_A = 25°C
P_D = 1.6W

TO-92
P_D = 1W
T_C = 25°C
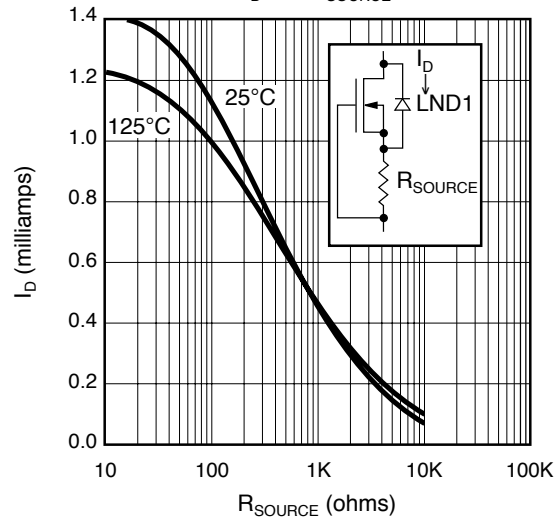
3
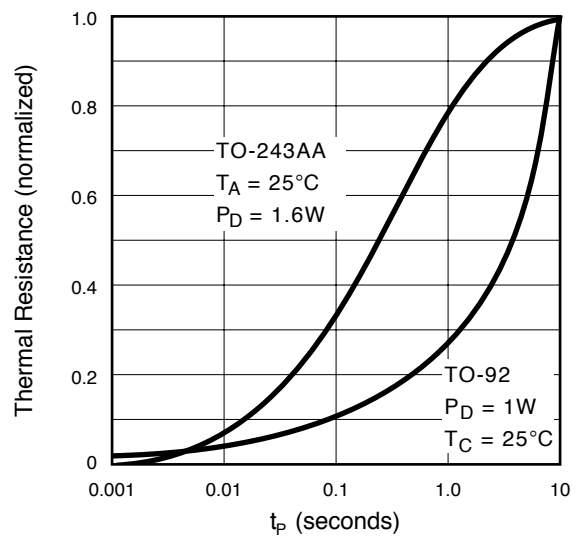
Typical Performance Curves

BV$_{DSS}$ Variation with Temperature

V_{GS} = -5V

BV$_{DSS}$ (normalized)

T$_j$ (°C)

I$_D$ vs. R$_{SOURCE}$

25°C

125°C

I$_D$ (milliamps)

R$_{SOURCE}$ (ohms)
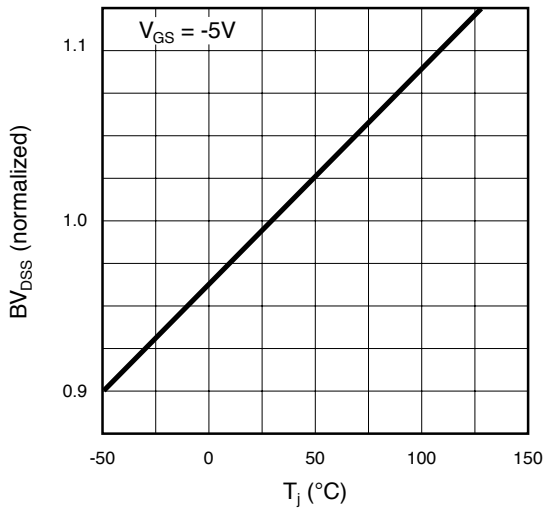
I$_D$
LND1
R$_{SOURCE}$

Transfer Characteristics

V_{DS} = 400V

T$_A$ = -55°C

T$_A$ = 25°C

T$_A$ = 125°C

I$_D$ (milliamps)

V$_{GS}$ (volts)
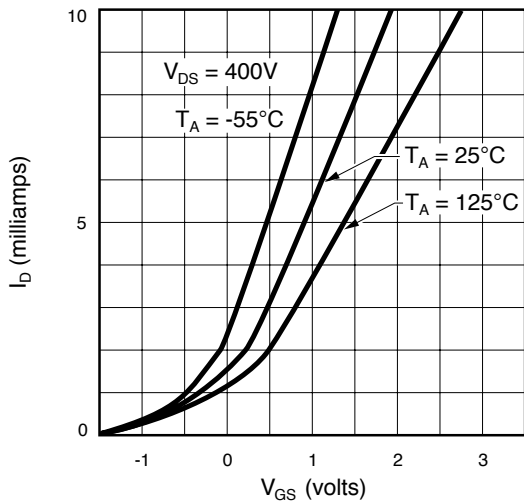
V$_{GS(OFF)}$ and R$_{DS}$ Variation with Temperature

R$_{DS(ON)}$ @ I$_D$ = 1mA

V$_{GS(OFF)}$ @ 100nA

V$_{GS(OFF)}$ (normalized)

R$_{DS(ON)}$ (normalized)

T$_j$ (°C)
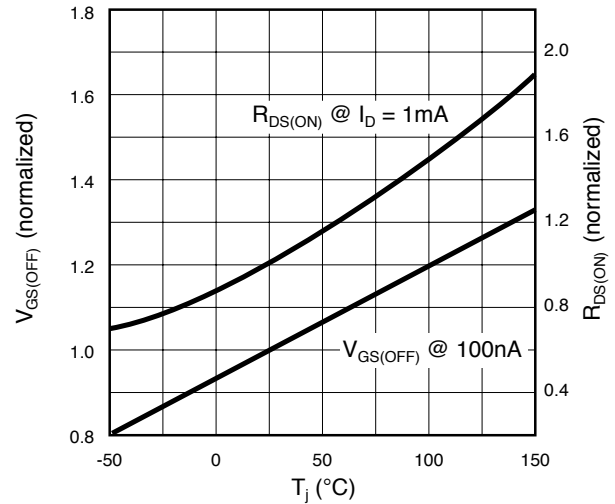
Capacitance vs. Drain-to-Source Voltage

V_{GS} = -10V

C$_{ISS}$

C$_{OSS}$

C$_{RSS}$

C (picofarads)

V$_{DS}$ (volts)
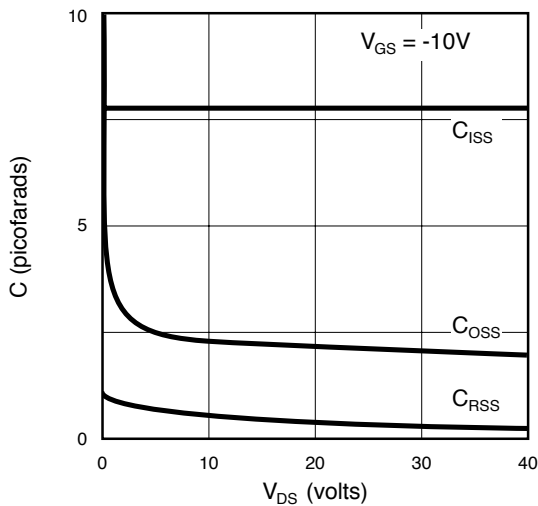
Gate Drive Dynamic Characteristics

8.7pF

V_{DS} = 20V

40V

60V

V$_{GS}$ (volts)

Q$_C$ (nanocoulombs)

12/13/010