



## N-Channel Depletion-Mode MOSFET

### Ordering Information

BV <sub>DSX</sub> / BV <sub>DGX</sub>	R <sub>DS(ON)</sub> (max)	I <sub>DSS</sub> (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<sub>ISS</sub>

### 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 <sub>DSX</sub>
Drain-to-Gate Voltage	BV <sub>DGX</sub>
Gate-to-Source Voltage	±20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

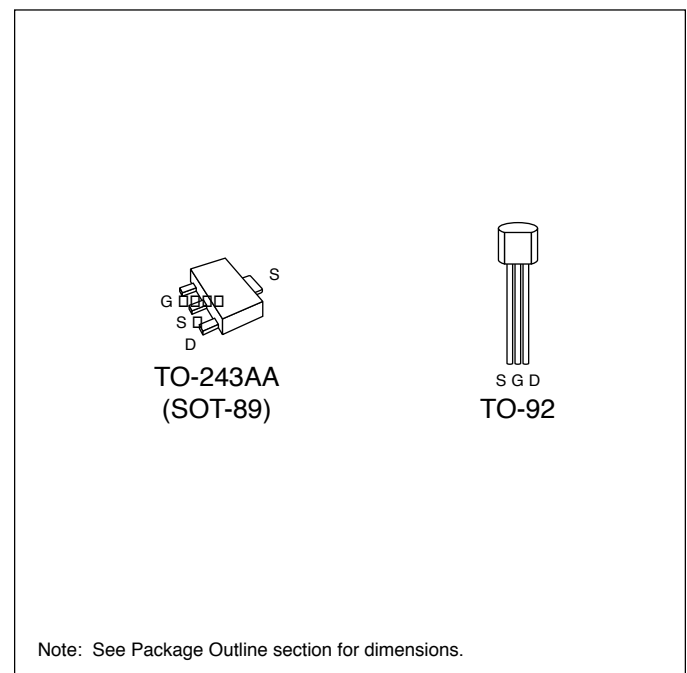
\* Distance of 1.6 mm from case for 10 seconds.

### 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



## Thermal Characteristics

Package	$I_D$ (continuous)*	$I_D$ (pulsed)	Power Dissipation @ $T_A = 25^\circ\text{C}$	$\theta_{jc}$ $^\circ\text{C/W}$	$\theta_{ja}$ $^\circ\text{C/W}$	$I_{DR}$	$I_{DRM}^*$
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  $T_r$ .

† Mounted on FR5 Board, 25mm x 25mm x 1.57mm. Significant  $P_D$  increase possible on ceramic substrate.

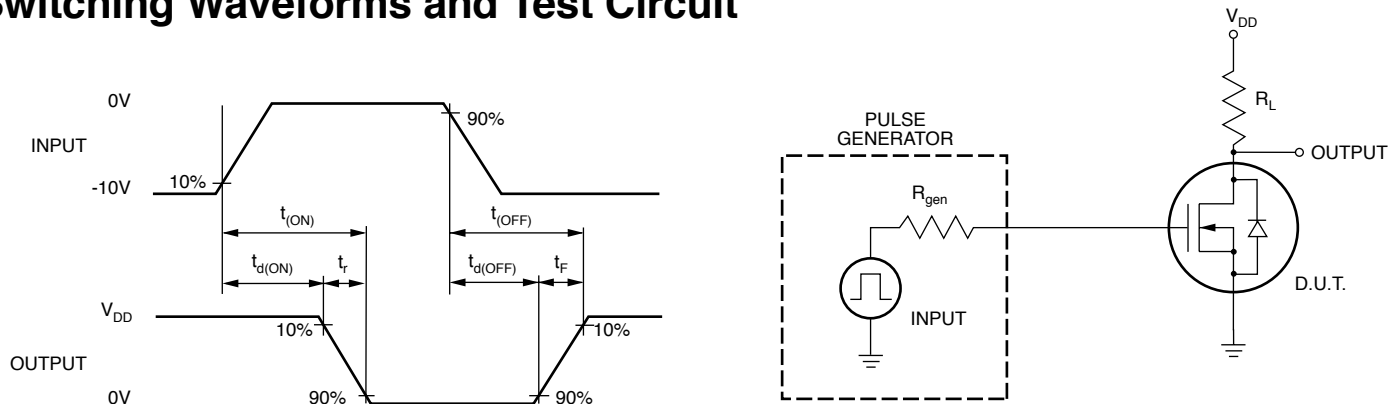
## Electrical Characteristics (@ $25^\circ\text{C}$ unless otherwise specified)

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

### Notes:

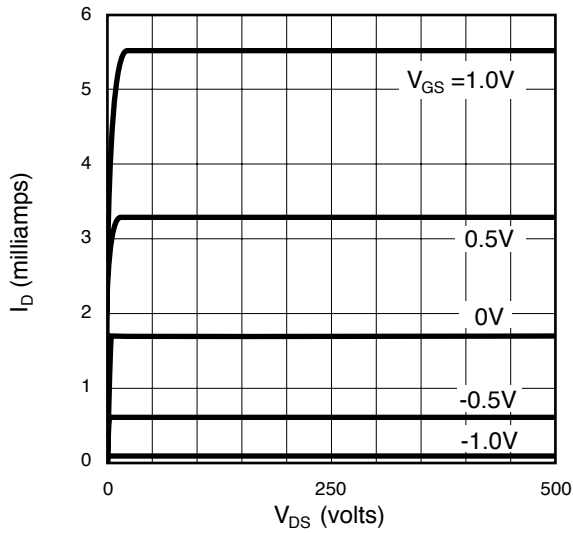
- All D.C. parameters 100% tested at  $25^\circ\text{C}$  unless otherwise stated. (Pulse test: 300 $\mu\text{s}$  pulse, 2% duty cycle.)
- All A.C. parameters sample tested.

## Switching Waveforms and Test Circuit

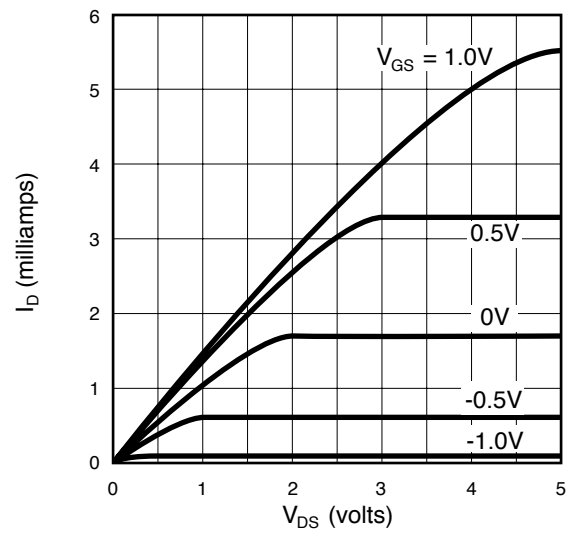


# Typical Performance Curves

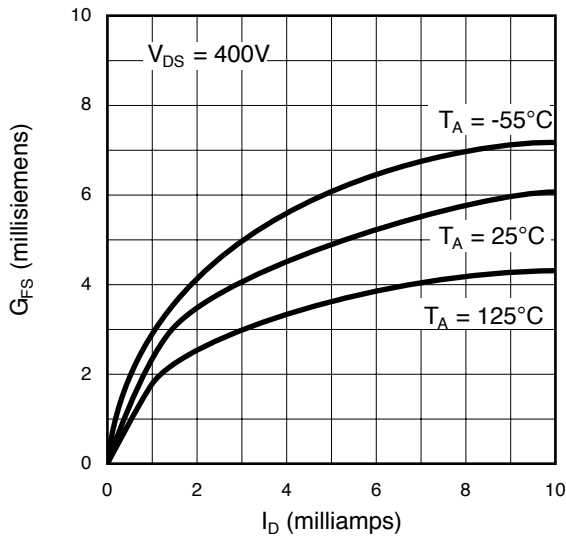
Output Characteristics



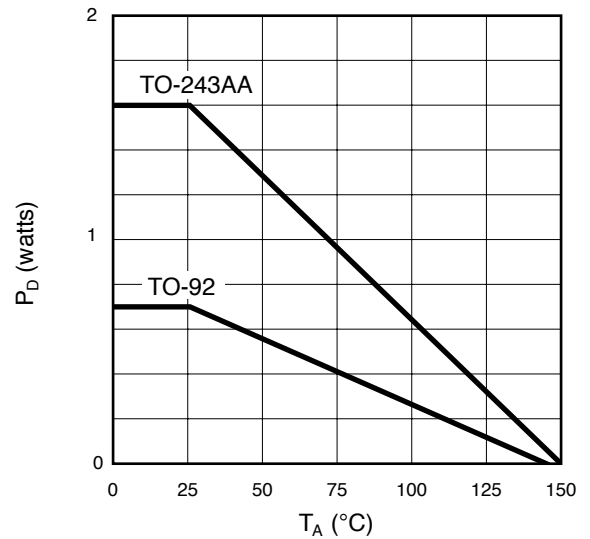
Saturation Characteristics



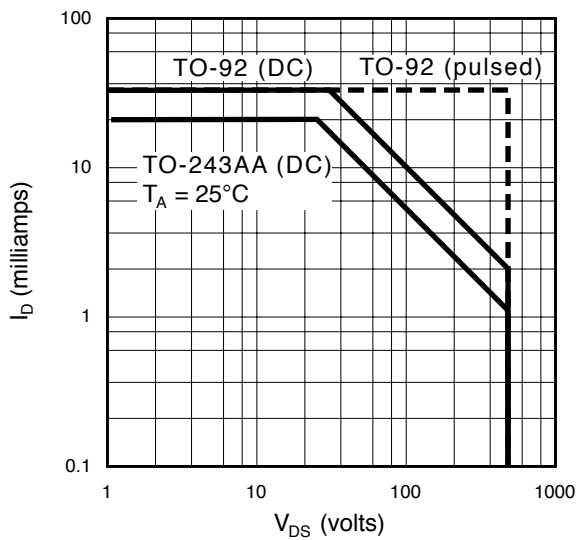
Transconductance vs. Drain Current



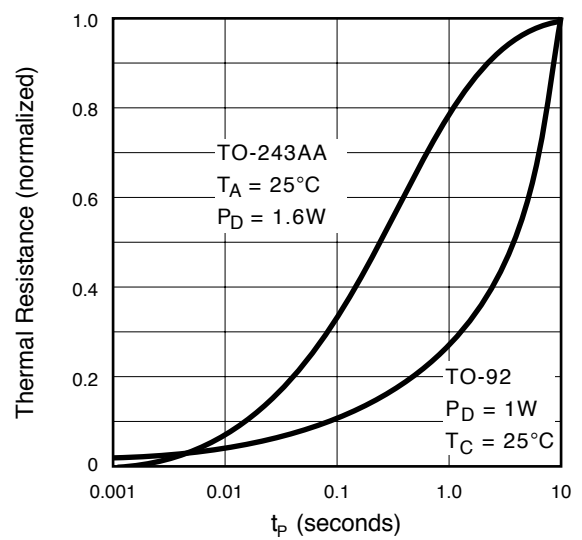
Power Dissipation vs. Ambient Temperature



Maximum Rated Safe Operating Area

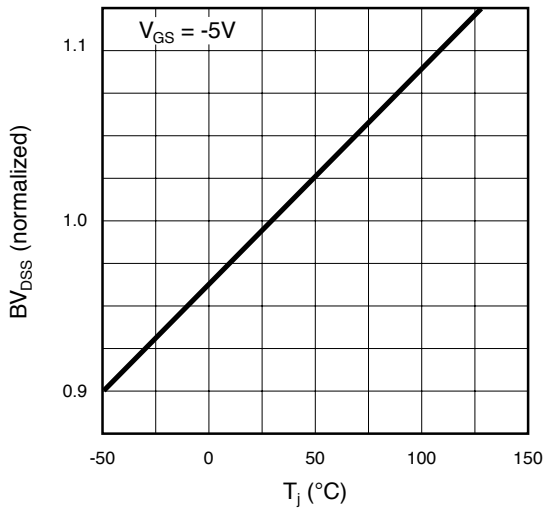


Thermal Response Characteristics

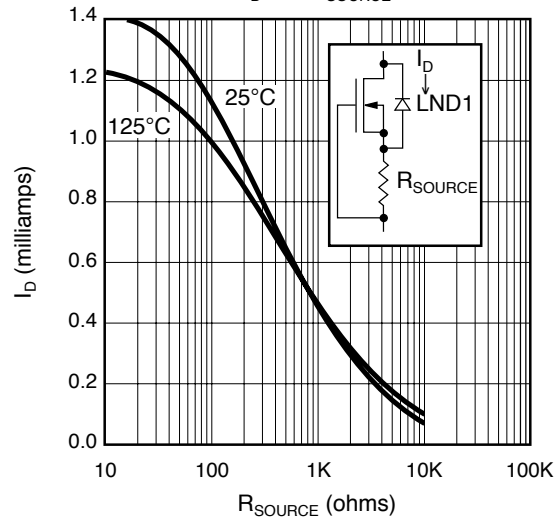


# Typical Performance Curves

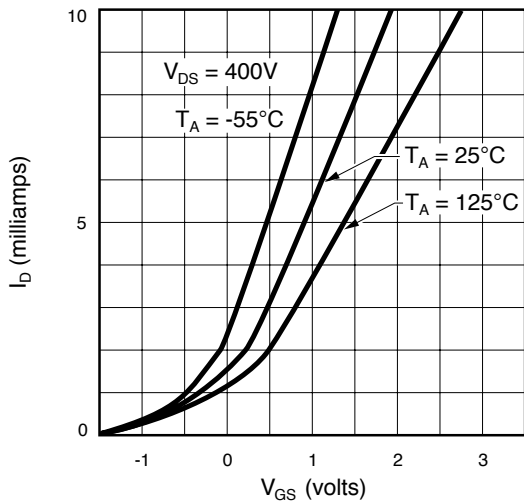
BV<sub>DSS</sub> Variation with Temperature



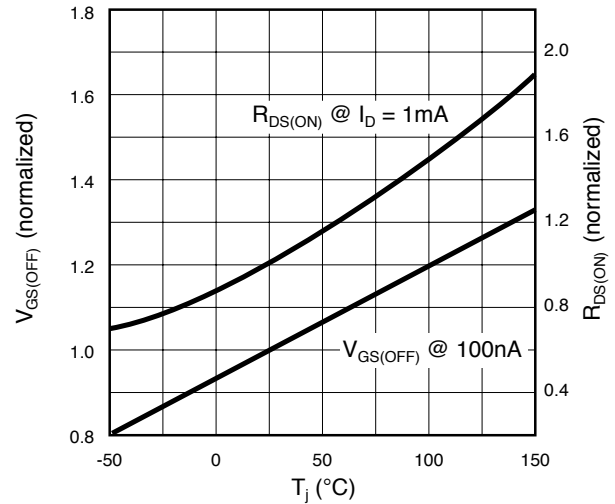
I<sub>D</sub> vs. R<sub>SOURCE</sub>



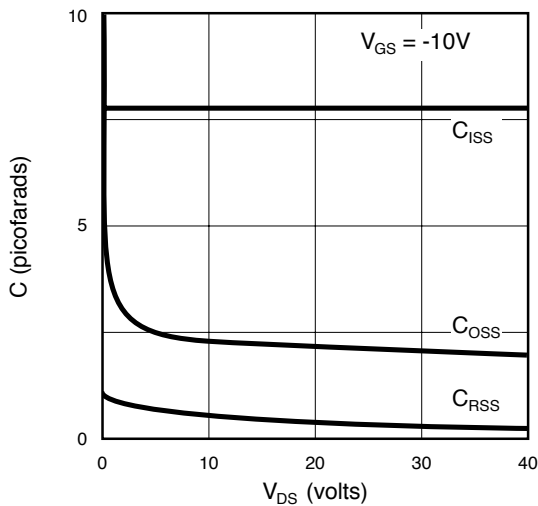
Transfer Characteristics



V<sub>GS(OFF)</sub> and R<sub>DS</sub> Variation with Temperature



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics

