LEADING TECHNOLOGY
Semiconductor

LTD50NS03

30V N-CHANNEL TRENCH FET WITH ISD

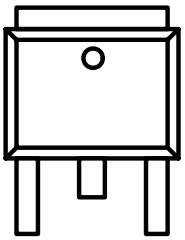
FEATURES

- V_{DSS}=30V
- I_{DS} =50A @ V_{GS}=10V
- $R_{DS(ON)}$<7mΩ @ V_{GS}=10V I_D=15A
- $Q_{g\_typ.}$=27nC @ V_{GS}=5V

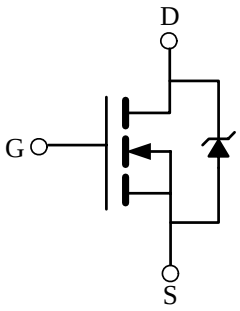
APPICATION

- Notebook Low Side
- DC/DC Converter
- Synchronous Rectifier Switch

TO-252 D-PAK
Top View



Drain Connected to Tab



ABSOLUTE MAXIMUM RATING

(T_A = 25 °C UNLESS OTHERWISE NOTED)				
Parameter		**Symbol**	**Rating**	**Units**
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current[A]	T_C=25°C	I_D	50	A
	T_C=100°C		35	
Pulsed Drain Current[C]	Pulse	I_{DM}	100	
Single Pulse Avalanche Current[B]	T_{start}=25 °C	I_{AS}	22	A
Power Dissipation[A]	T_C=25°C	P_D	35	W
	T_C=100°C		14	
Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	°C
Single Avalanche Energy[B]	L=1mH	E_{AS}	240	mJ

THERMAL RESISTANCE RATINGS			
Parameter	**Symbol**	**Maximum**	**Units**
Maximum Junction-to-Ambient[D]	$R_{\theta JA}$	65	°C/W
Maximum Junction-to-Case[D]	$R_{\theta JC}$	3.5	°C/W

TRENCH FET ELECTRICAL CHARACTERISTICS

SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1mA	30			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	1	1.9	3	
Breakdown Voltage Temperature Coefficient	BV_{DSS}/T_J	I_D=10mA, Referenced to 25ºC		22		mV/ºC
Gate Threshold Voltage Temperature Coefficient	V_{GSTH}/T_J	I_D=10mA, Referenced to 25ºC		-5		
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =24V, V_{GS} = 0 V			500	uA
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 15A		5.5	7	mΩ
		V_{GS} = 4.5 V, I_D =13.5 A		7.3	9	
		V_{GS}=10V, I_D=15A, T_J=125°C		8.5		
Forward Transconductance	g_{FS}	V_{DS}=10V, I_D=15A		60		S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{DS}=15V, V_{GS}=0V, f=1.0Mhz		2659		pF
Output Capacitance	C_{OSS}			383		
Reverse Transfer Capacitance	C_{RSS}			248		
Total Gate Charge (V_{GS}=10V)	Q_g	V_{DS} = 15 V, I_D = 15 A, V_{GS}=10V		50		nC
Total Gate Charge (V_{GS}=5V)				27		
Gate-Source Charge	Q_{gs}			7		
Gate-Drain Charge	Q_{gd}			11		
Switching Characteristics[E]						
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=10V, V_{DD}=15V, I_D=1A, R_g=5Ω		11.6		nS
Rise Time	t_r			7.6		
Turn-Off Delay Time	$t_{d(off)}$			61.2		
Fall-Time	t_f			21.6		
Gate Resistance	R_g	f=1MHz		2.6		Ω
Body Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=3.5A V_{GS}=0V. I_S=7A		0.45 0.58	0.7	V
Reverse Recovery Time[E]	t_{rr}	V_{GS}=0V, I_F=13.5A, dI_F/dt=280A/us		17		ns
Diode Reverse Charge[E]	Q_{rr}			14.5		nC

Notes:

A, Drain current and Power dissipation are based on maximum junction temperature $T_{j\,(max)}$=150° C.

B, Single pulse UIS energy, inductor=1mH, V_{GS}=10V , T_{start}=25° C.

C, Pulse width limited by junction temperature $T_{j\,(mxa)}$=150° C, the pulse current value was based on T_A=25° C, repetitive rating based on duty cycles to keep initial T_j=25° C.

D, The value of $R_{\theta JA}$ and $R_{\theta JC}$ were measured with device mounted on tested board based on JESD51-7 requirement, and in still air environment with T_A=25° C in according to JESD51-2.

E, Pulse test: PW ≤ 300us duty cycle ≤ 2%.

Typical Electrical Characteristics (N-Channel)

T_A = +25ºC, unless otherwise noted

Figure 1. On-Regions Characteristics

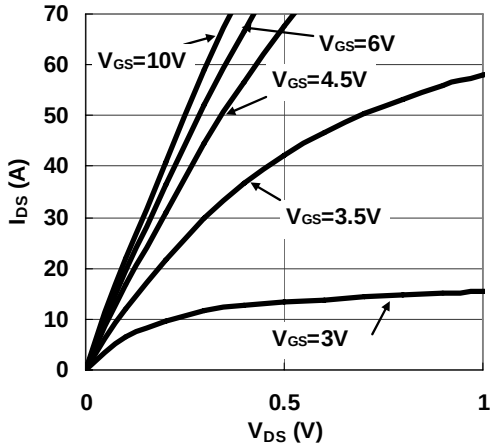


Figure 2. On-Resistance versus Drain Current

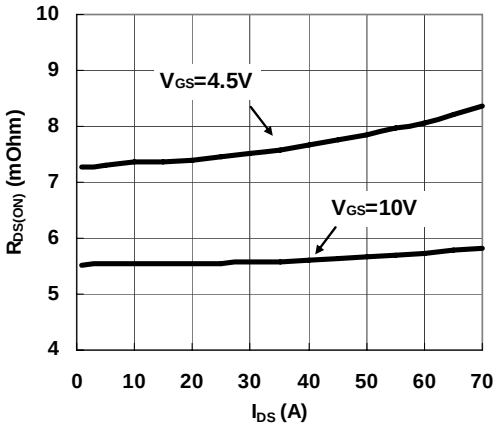


Figure3. On-Resistance Normalized versus Temperature

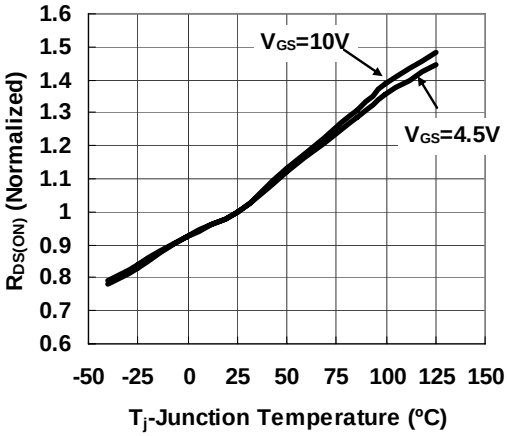


Figure 4. On-Resistance versus Gate to Source Voltage

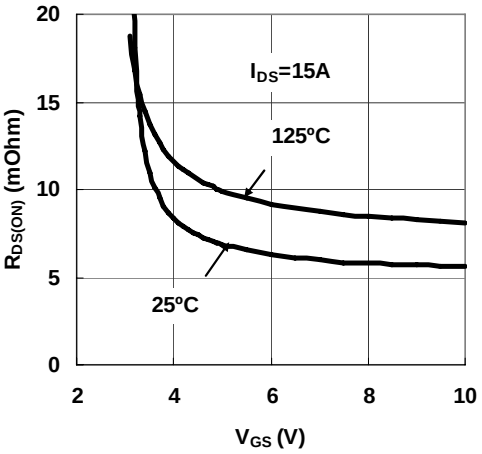


Figure 5. Transfer Characteristics

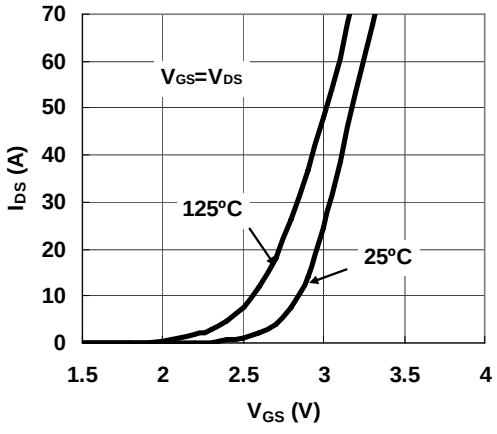
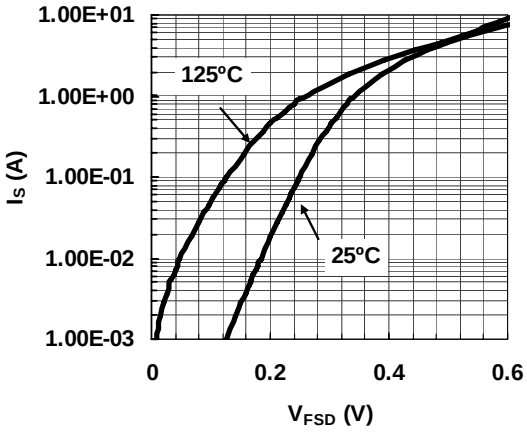


Figure 6. Body Diode Forward Voltage versus Source Current



Typical Electrical Characteristics (N-Channel)

T_A = +25ºC, unless otherwise noted

Figure 7. Threshold versus Temperature

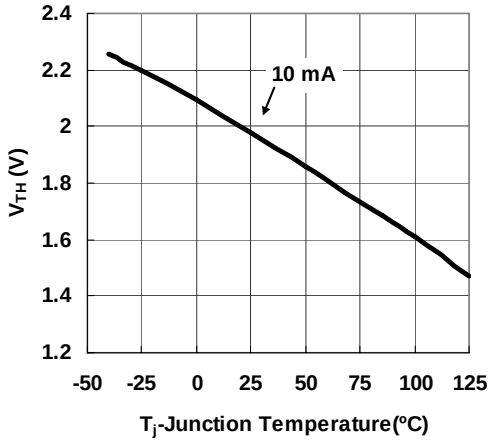


Figure 8. Body Diode Forward Voltage versus Temperature

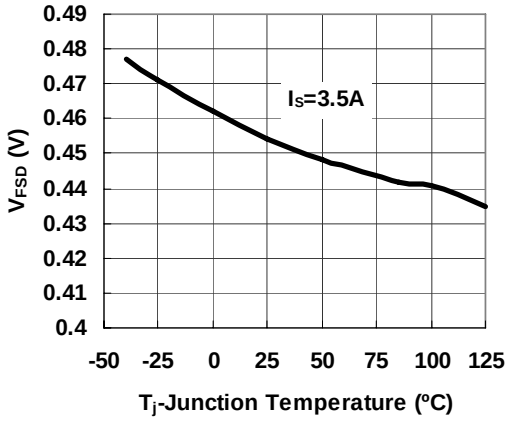


Figure 9. Gate Charge Characteristics

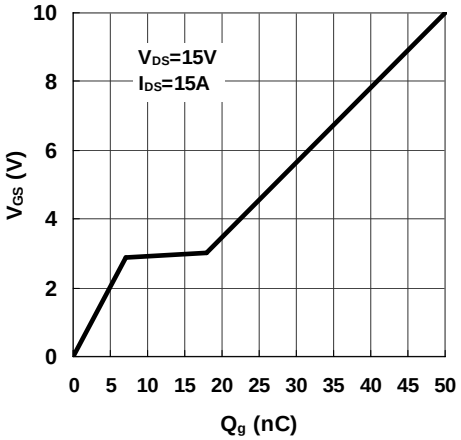


Figure 10. Capacitance Characteristics

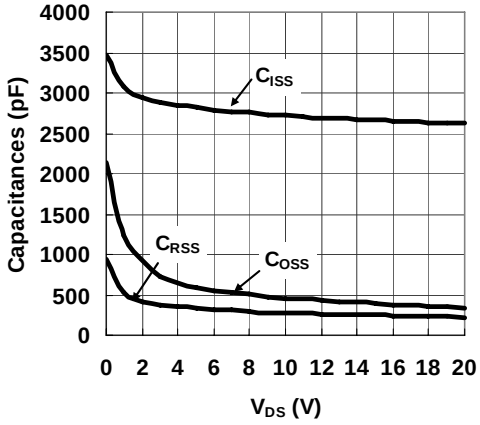


Figure 11. ISDMOSFET Body Diode reverse recovery characteristic

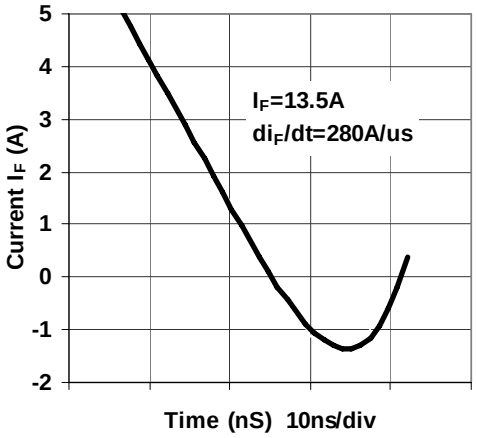
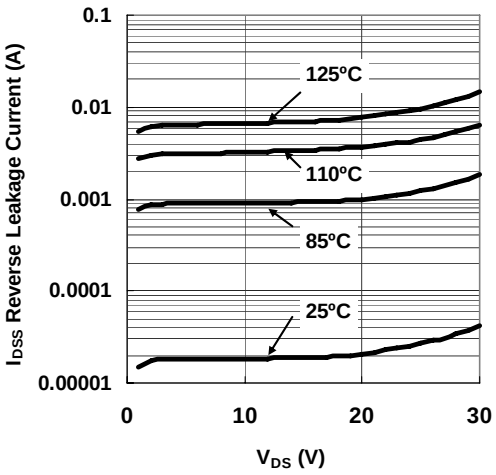
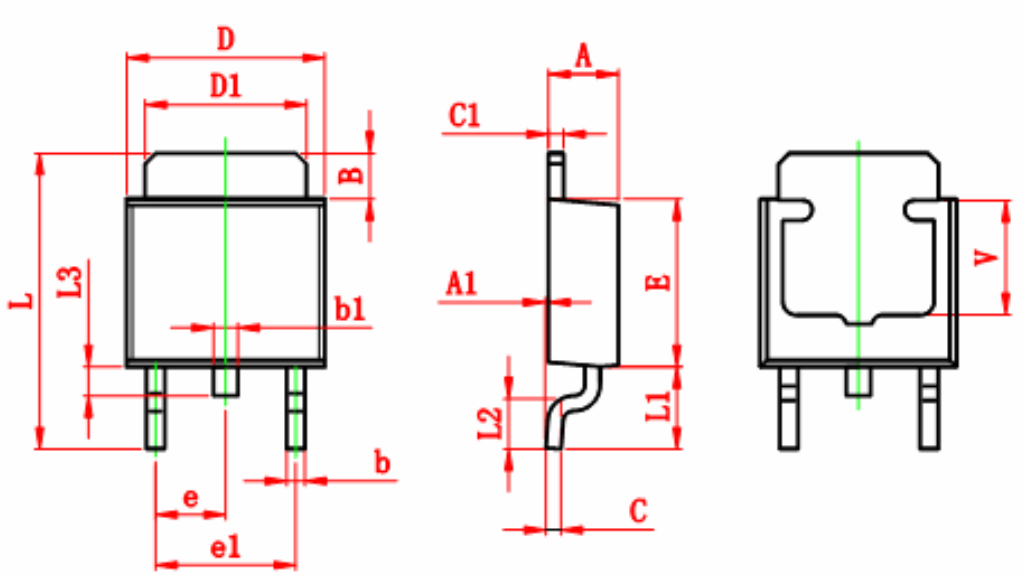


Figure 12. ISDMOSFET Body Diode reverse leakage versus Drain-Source voltage and Temperature



TO-252 Package Outline Drawing



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF.		0.150 REF.	