



N-Channel Enhancement Mode Field Effect Transistor

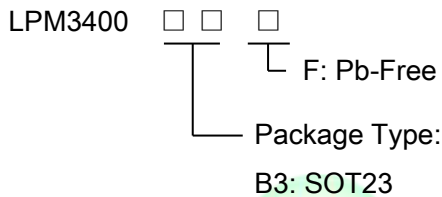
General Description

The LPM3400 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.1V. This device is suitable for use as a load switch or in PWM applications. Standard Product LPM3400 is Pb-free.

Features

- ◆ 20V/5A, $R_{DS(ON)} < 33m\Omega(max.)@VGS=4.5V$
- ◆ 20V/4A, $R_{DS(ON)} < 52m\Omega(max.)@VGS=2.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ SOT23 Package

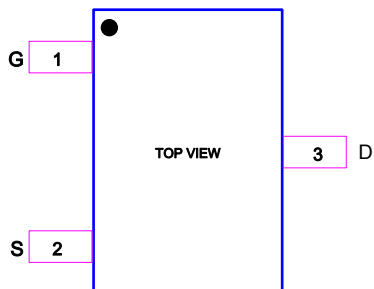
Order Information



Applications

- ◇ Driver for Relay, Solenoid, Motor, LED etc.
- ◇ DC-DC converter circuit
- ◇ Power Switch
- ◇ Load Switch
- ◇ Charging

Pin Configurations



Marking Information

Device	Marking	Package	Shipping
LPM340B3F	A2SXX	SOT23	3K



Absolute Maximum Ratings

Parameter	Symbol	Maximum	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current	TA=25°C	5.8	A
	TA=70°C	4.9	
Pulsed Drain Current	I_{DM}	30	
Power Dissipation	TA=25°C	1.4	W
	TA=70°C	1	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

Thermal resistance ratings

Parameter	Symbol	MAX	Unit
Junction-to-Case Thermal Resistance	$R_{\theta JA}$	125	°C/W





Electrical Characteristics

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=20\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=12\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.7	1.1	1.4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=5.8\text{A}$		22	28	m Ω
		$V_{GS}=4.5\text{V}, I_D=5\text{A}$		27	33	
		$V_{GS}=2.5\text{V}, I_D=4\text{A}$		43	52	
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=5\text{A}$	10	15		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.7	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		400		pF
C_{oss}	Output Capacitance			99		pF
C_{rss}	Reverse Transfer Capacitance			77		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		1.2	3.6	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=4.5\text{V}, V_{DS}=15\text{V},$ $I_D=5.8\text{A}$		9.7		nC
$Q_g(4.5\text{V})$	Total Gate Charge			1.6		nC
Q_{gs}	Gate Source Charge			3.1		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=15\text{V},$ $R_L=2.7\Omega, R_{GEN}=3\Omega$		3.3		ns
t_r	Turn-On Rise Time			4.8		ns
$t_{D(off)}$	Turn-Off Delay Time			26.3		ns
t_f	Turn-Off Fall Time			4.1		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		16		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		8.9		nC



Typical Characteristics

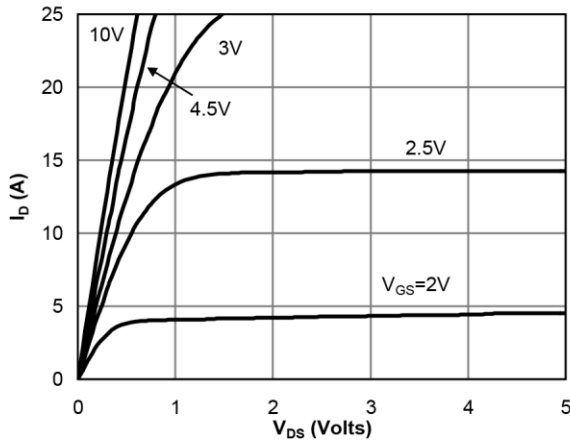


Fig 1: On-Region Characteristics

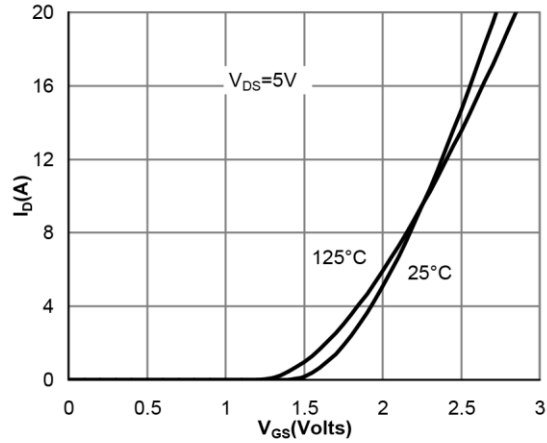


Figure 2: Transfer Characteristics

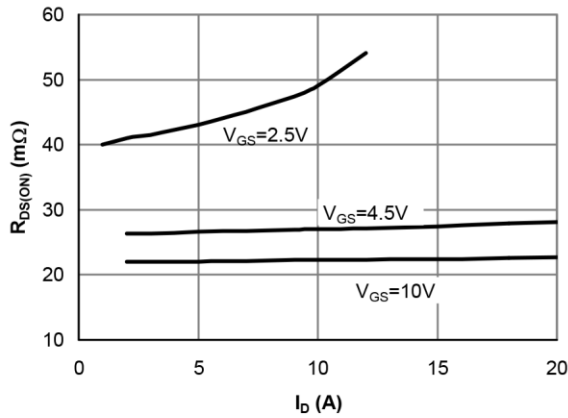


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

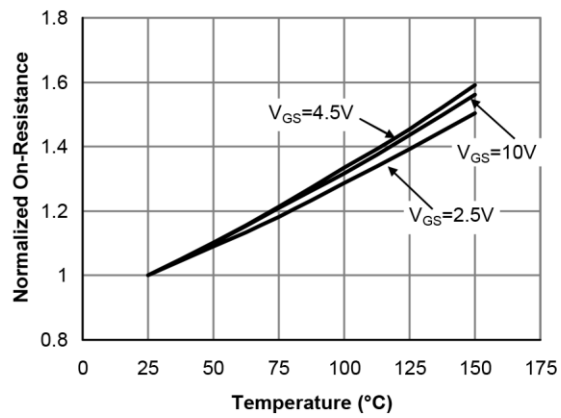


Figure 4: On-Resistance vs. Junction Temperature

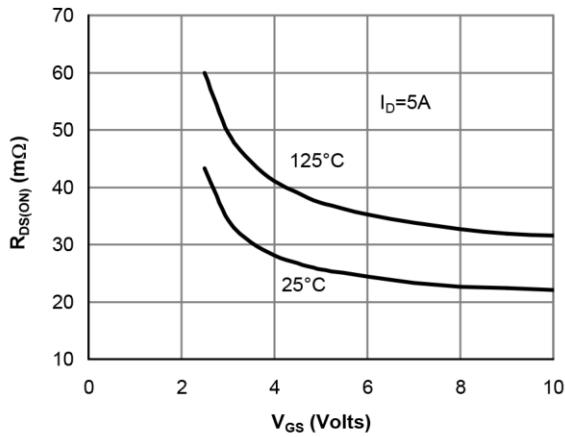


Figure 5: On-Resistance vs. Gate-Source Voltage

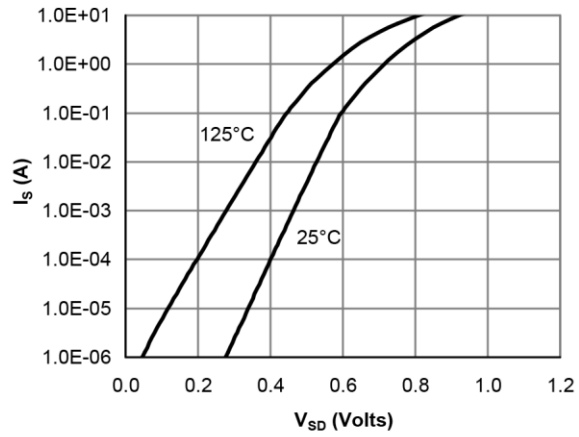


Figure 6: Body-Diode Characteristics

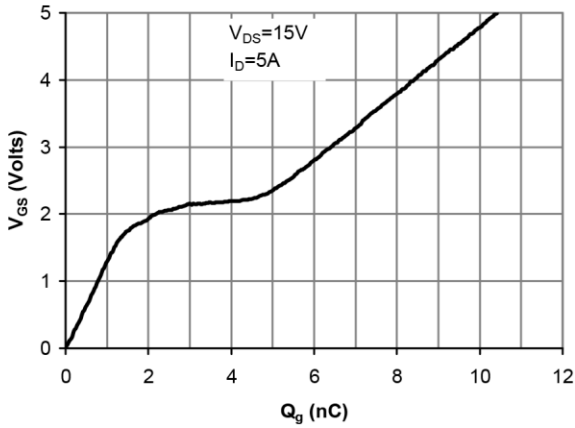


Figure 7: Gate-Charge Characteristics

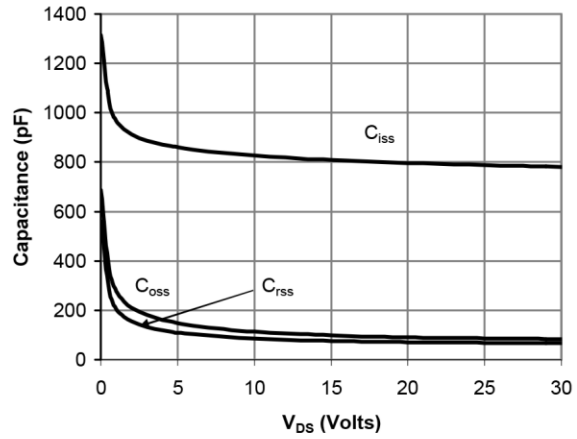


Figure 8: Capacitance Characteristics

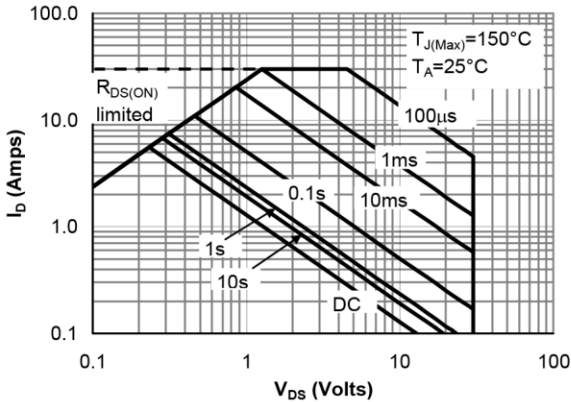


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

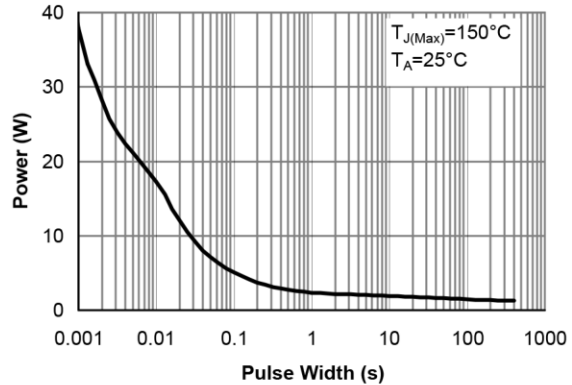


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

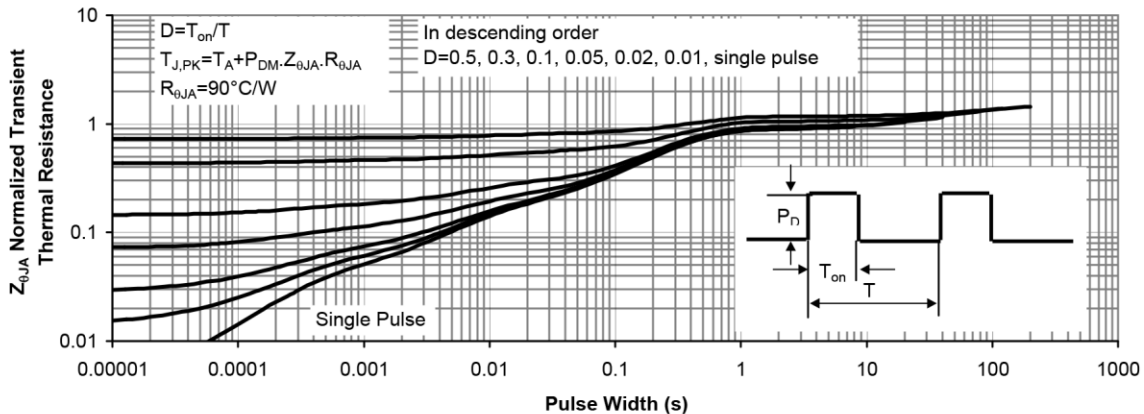
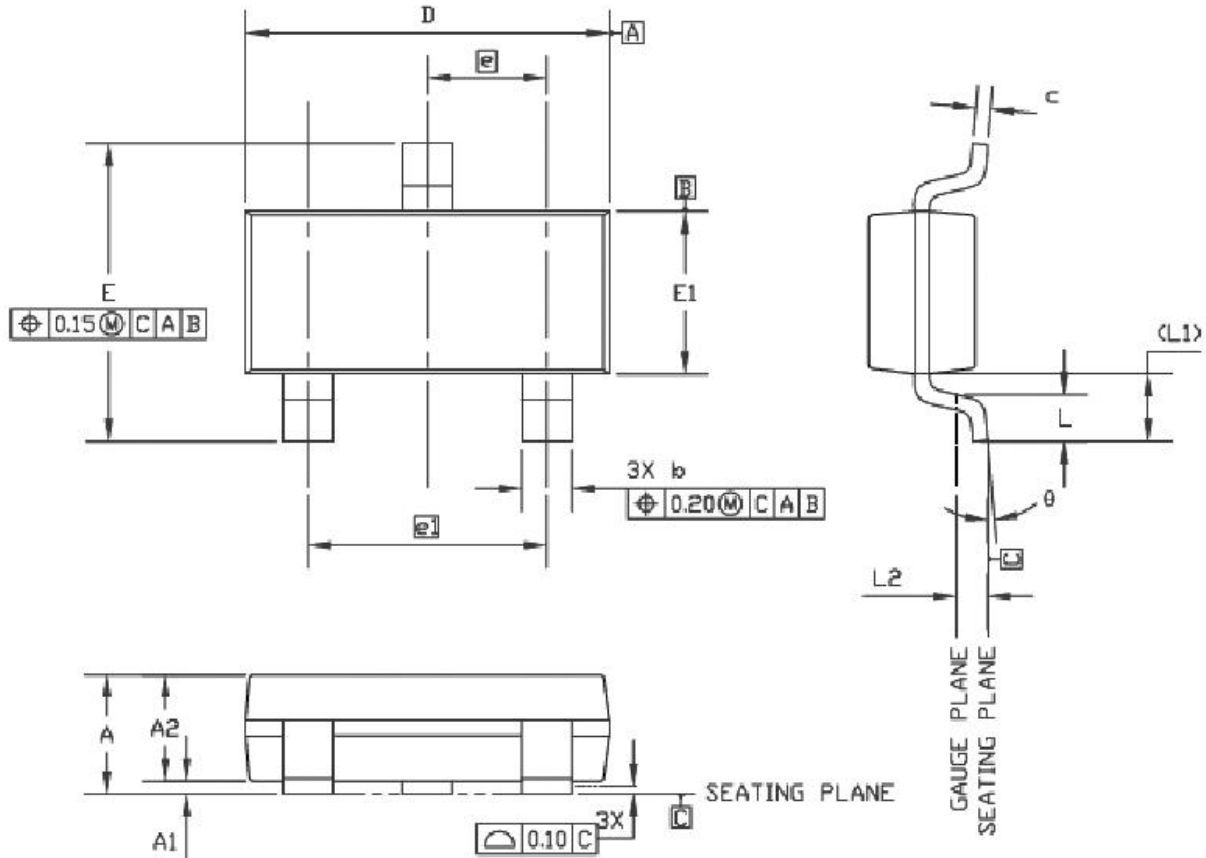


Figure 11: Normalized Maximum Transient Thermal Impedance

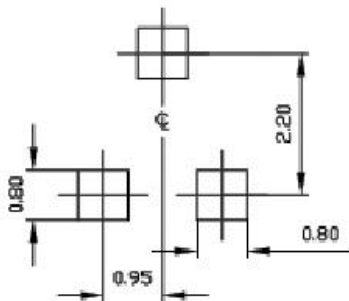


Packaging Information

SOT-23 STANDARD PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.75	—	1.17	0.030	—	0.046
A1	0.05	—	0.15	0.002	—	0.006
A2	0.70	0.85	1.02	0.028	0.033	0.040
b	0.30	—	0.50	0.012	—	0.020
c	0.08	—	0.20	0.003	—	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	2.10	—	2.64	0.083	—	0.104
E1	1.20	1.30	1.40	0.047	0.051	0.055
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.40	0.50	0.60	0.016	0.020	0.024
L1	0.54 REF			0.021 REF		
L2	0.25			0.010		
θ1	0°	—	8°	0°	—	8°