

30V P-Channel Enhancement-Mode MOSFET

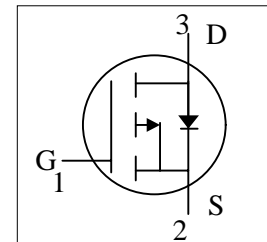
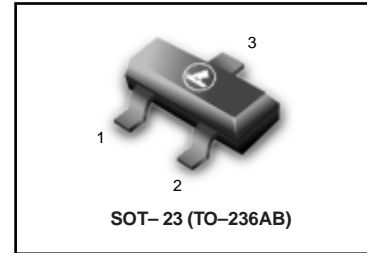
$V_{DS} (V) = -30V$

$R_{DS(ON)} < 70m\Omega (V_{GS} = -10V)$

$R_{DS(ON)} < 80m\Omega (V_{GS} = -4.5V)$

$R_{DS(ON)} < 120m\Omega (V_{GS} = -2.5V)$

LP3401LT1G



FEATURES

Advanced trench process technology

High Density Cell Design For Ultra Low On-Resistance

ORDERING INFORMATION

Device	Marking	Shipping
LP3401LT1G	A1	3000/Tape&Reel
LP3401LT3G	A1	10000/Tape&Reel

MAXIMUM RATINGS ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^A	I_D	$T_A=25^\circ C$	-4.2
		$T_A=70^\circ C$	-3.5
Pulsed Drain Current ^B	I_{DM}	-30	A
Power Dissipation ^A	P_D	$T_A=25^\circ C$	1.4
		$T_A=70^\circ C$	1
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

THERMAL CHARACTERISTICS ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	65	90	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	85	125	$^\circ C/W$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	43	60	$^\circ C/W$

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ C$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JL}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = -250\mu\text{A}$, $V_{GS} = 0\text{V}$	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -24\text{V}$, $V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 12\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$	-0.7	-1	-1.3	V
$I_{D(ON)}$	On state drain current	$V_{GS} = -4.5\text{V}$, $V_{DS} = -5\text{V}$	-25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{V}$, $I_D = -4.2\text{A}$			70	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}$, $I_D = -4\text{A}$			80	$\text{m}\Omega$
		$V_{GS} = -2.5\text{V}$, $I_D = -1\text{A}$			120	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{V}$, $I_D = -5\text{A}$	7	11		S
V_{SD}	Diode Forward Voltage	$I_S = -1\text{A}$, $V_{GS} = 0\text{V}$		-0.75	-1	V
I_S	Maximum Body-Diode Continuous Current				-2.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = -15\text{V}$, $f = 1\text{MHz}$		954		pF
C_{oss}	Output Capacitance			115		pF
C_{riss}	Reverse Transfer Capacitance			77		pF
R_g	Gate resistance	$V_{GS} = 0\text{V}$, $V_{DS} = 0\text{V}$, $f = 1\text{MHz}$		6		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS} = -4.5\text{V}$, $V_{DS} = -15\text{V}$, $I_D = -4\text{A}$		9.4		nC
Q_{gs}	Gate Source Charge			2		nC
Q_{gd}	Gate Drain Charge			3		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -10\text{V}$, $V_{DS} = -15\text{V}$, $R_L = 3.6\Omega$, $R_{GEN} = 6\Omega$		6.3		ns
t_r	Turn-On Rise Time			3.2		ns
$t_{D(off)}$	Turn-Off Delay Time			38.2		ns
t_f	Turn-Off Fall Time			12		ns
t_{rr}	Body Diode Reverse Recovery Time		$I_F = -4\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$		20.2	
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = -4\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$		11.2		nC

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TYPICAL ELECTRICAL CHARACTERISTICS

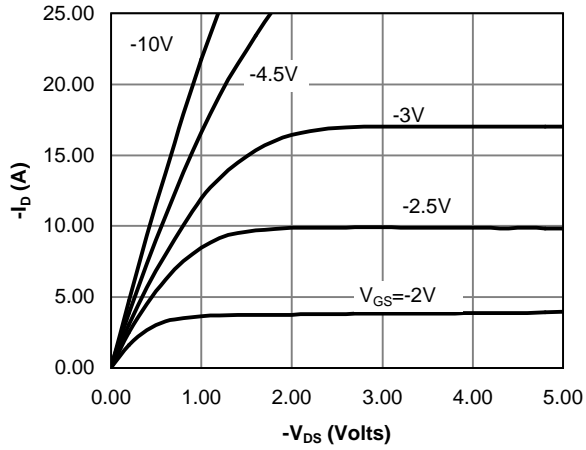


Fig 1: On-Region Characteristics

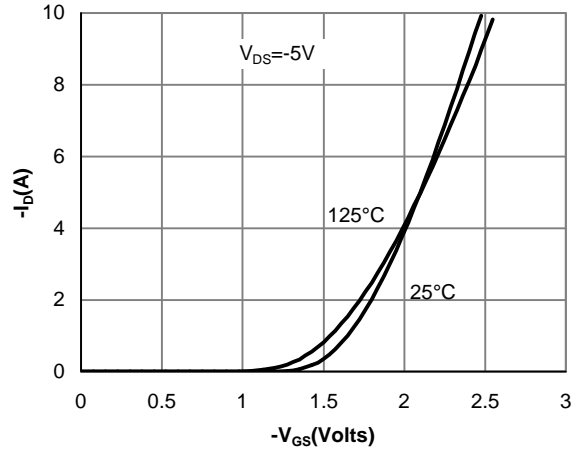


Figure 2: Transfer Characteristics

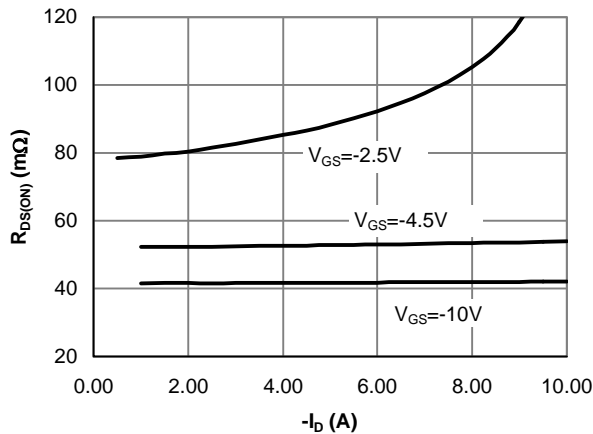


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

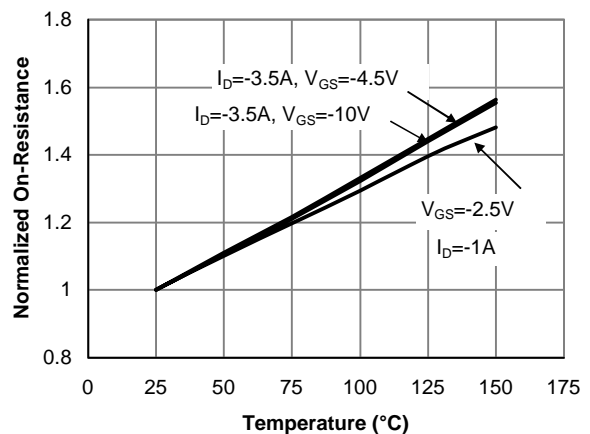


Figure 4: On-Resistance vs. Junction Temperature

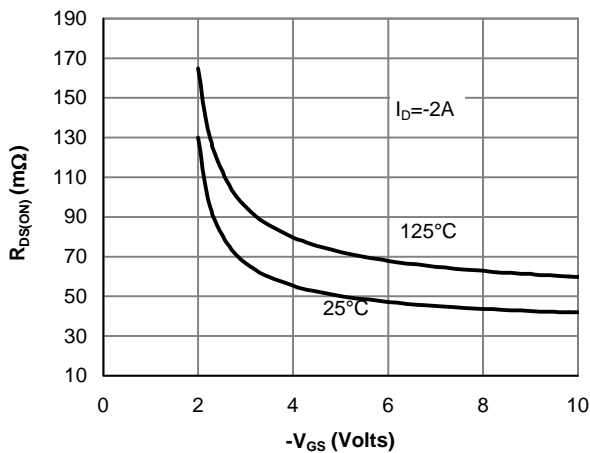


Figure 5: On-Resistance vs. Gate-Source Voltage

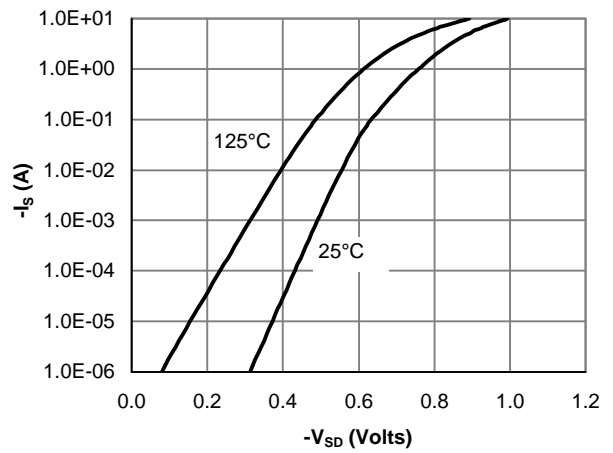


Figure 6: Body-Diode Characteristics

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TYPICAL ELECTRICAL CHARACTERISTICS

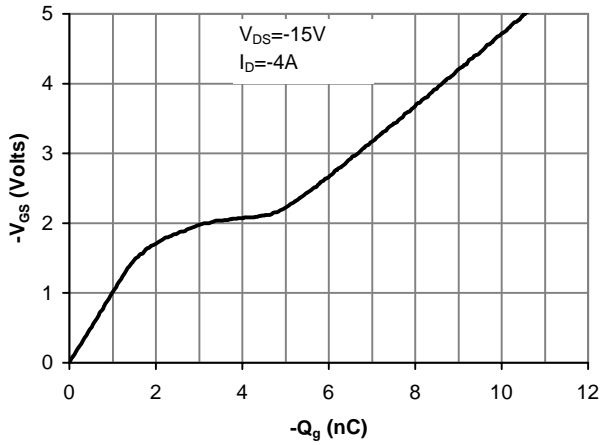


Figure 7: Gate-Charge Characteristics

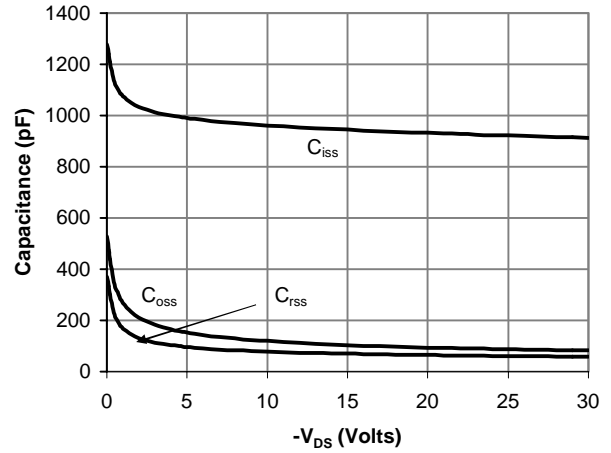


Figure 8: Capacitance Characteristics

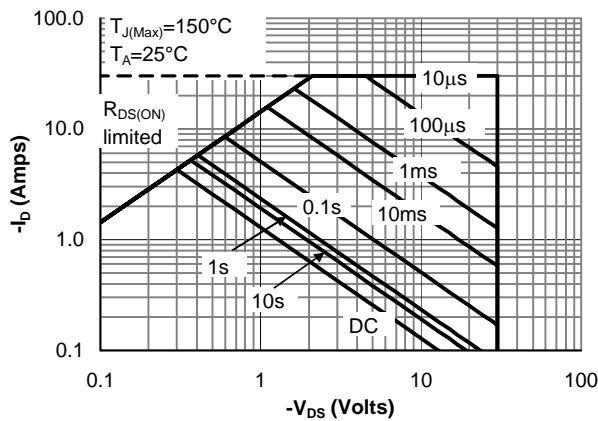


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

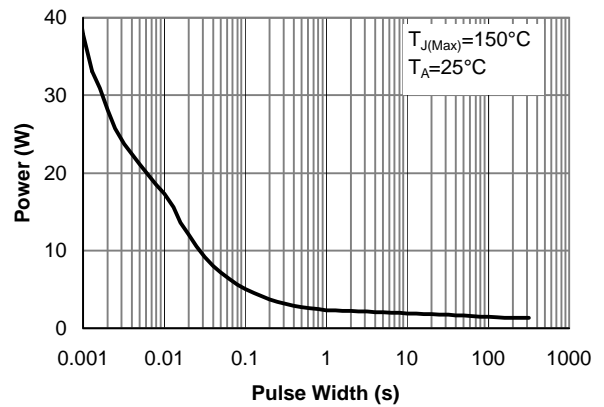


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

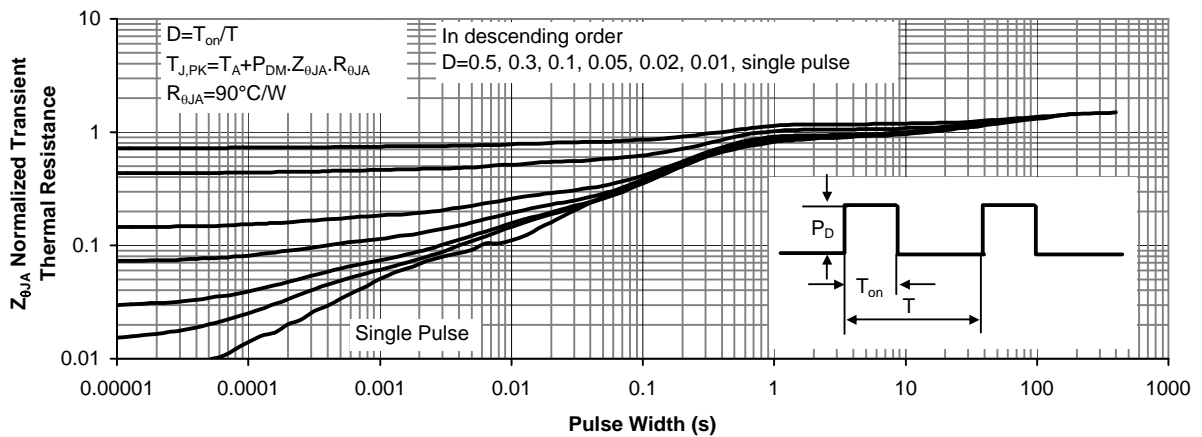


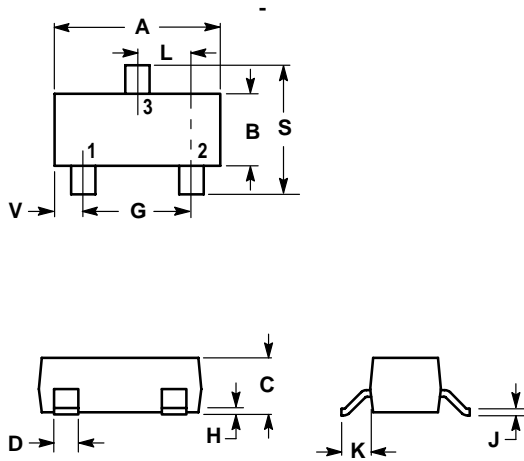
Figure 11: Normalized Maximum Transient Thermal Impedance

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NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
2. CONTROLLING DIMENSION: INCH.



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

