

## 30V P-Channel Enhancement-Mode MOSFET

$V_{DS}$	-30V
$I_D$ ( $V_{GS} = -10V$ )	-4.1A
$R_{DS(ON)}$ ( $V_{GS} = -10V$ )	< 70m $\Omega$
$R_{DS(ON)}$ ( $V_{GS} = -4.5V$ )	< 100m $\Omega$

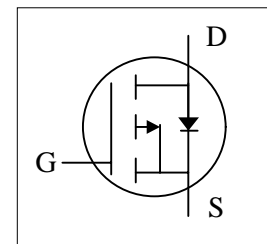
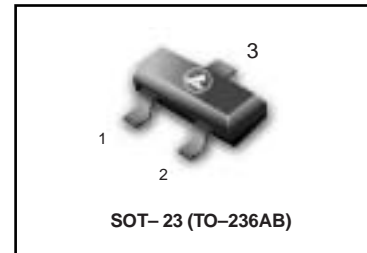
### FEATURES

The LP3407LT1G uses advanced trench technology to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use as a load switch or in PWM applications.

### ORDERING INFORMATION

Device	Marking	Shipping
LP3407LT1G	A07	3000/Tape&Reel
LP3407LT3G	A07	10000/Tape&Reel

LP3407LT1G



### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_A = 25^\circ\text{C}$	-4.1
		$T_A = 70^\circ\text{C}$	-3.5
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-25	A
Power Dissipation <sup>B</sup>	$P_D$	$T_A = 25^\circ\text{C}$	1.4
		$T_A = 70^\circ\text{C}$	0.9
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

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

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10\text{s}$	$R_{\theta JA}$	70	90	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient <sup>A D</sup>	Steady-State		100	125	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	63	80	$^\circ\text{C}/\text{W}$

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

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

C: The  $R_{\theta JA}$  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
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	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	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-1	-2	-3	V
$I_{D(ON)}$	On state drain current	$V_{GS} = -10\text{V}, V_{DS} = -5\text{V}$	-25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{V}, I_D = -4.1\text{A}$ $T_J = 125^\circ\text{C}$			70 95	m $\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -3\text{A}$			100	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\text{V}, I_D = -4\text{A}$		10		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	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = -15\text{V}, f = 1\text{MHz}$	415	520	625	pF
$C_{oss}$	Output Capacitance		70	100	130	pF
$C_{riss}$	Reverse Transfer Capacitance		40	65	90	pF
$R_g$	Gate resistance	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$	3.5	7.5	11.5	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS} = -10\text{V}, V_{DS} = -15\text{V}, I_D = -4\text{A}$	7.4	9.2	11	nC
$Q_g(4.5\text{V})$	Total Gate Charge		3.7	4.6	6	nC
$Q_{gs}$	Gate Source Charge		1.3	1.6	1.9	nC
$Q_{gd}$	Gate Drain Charge		1.3	2.2	3.1	nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS} = -10\text{V}, V_{DS} = -15\text{V}, R_L = 3.6\Omega,$ $R_{GEN} = 3\Omega$		7.5		ns
$t_r$	Turn-On Rise Time			5.5		ns
$t_{D(off)}$	Turn-Off DelayTime			19		ns
$t_f$	Turn-Off Fall Time			7		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = -4\text{A}, di/dt = 100\text{A}/\mu\text{s}$	8.8	11	13	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F = -4\text{A}, di/dt = 100\text{A}/\mu\text{s}$	4	5.3	6.4	nC

# LP3407LT1G

## TYPICAL ELECTRICAL CHARACTERISTICS

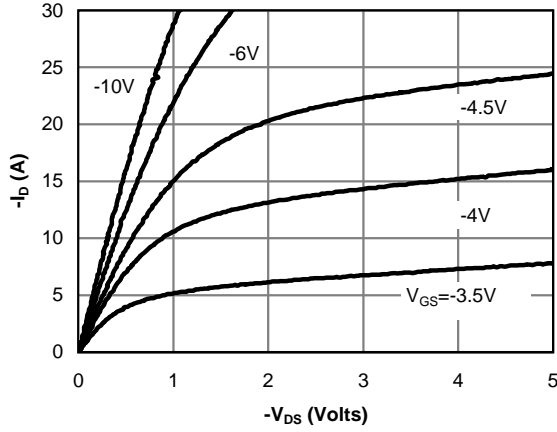


Figure 1: On-Region Characteristics (Note E)

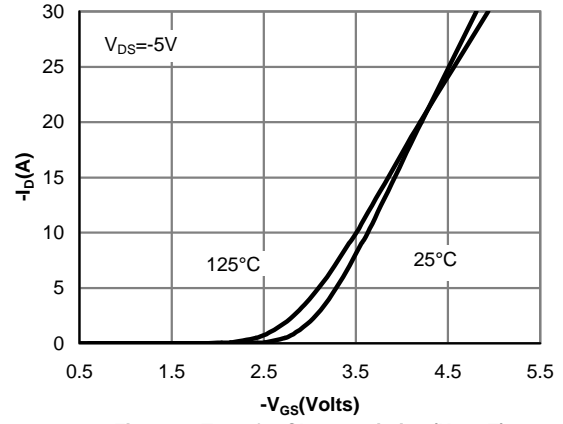


Figure 2: Transfer Characteristics (Note E)

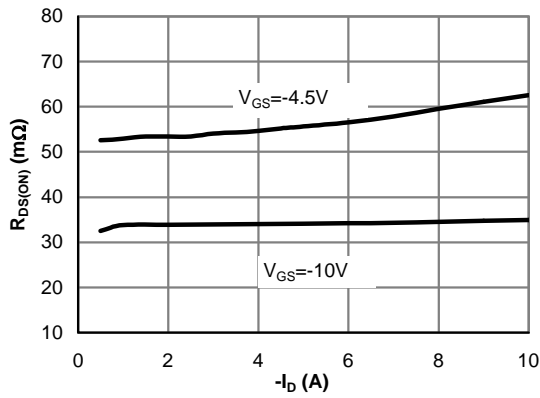


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

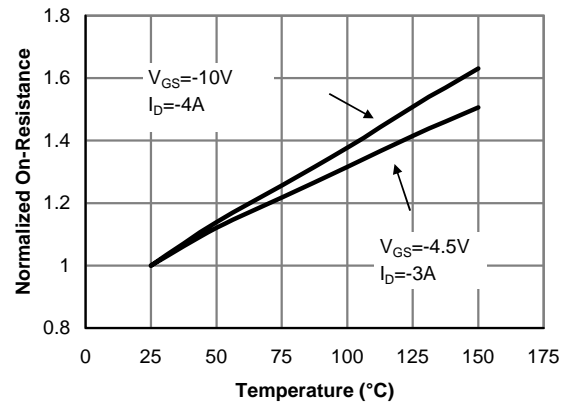


Figure 4: On-Resistance vs. Junction Temperature (Note E)

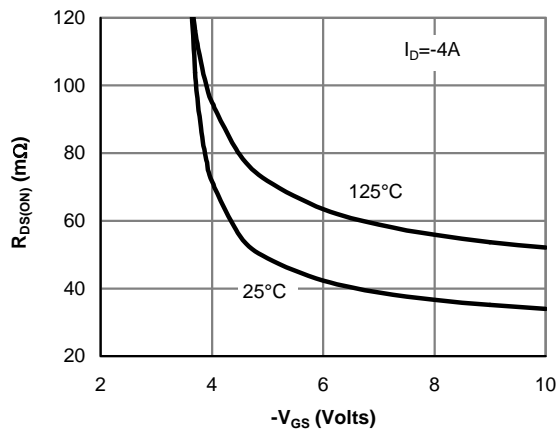


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

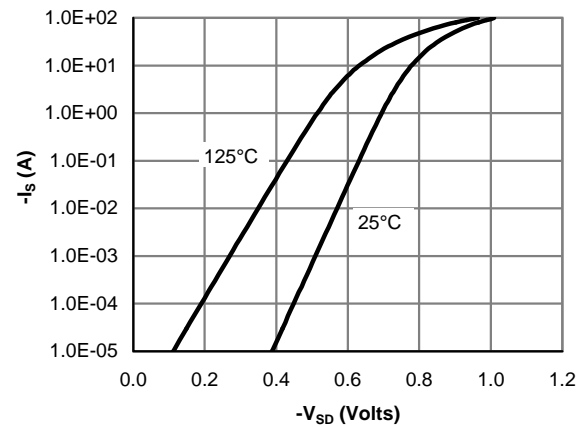


Figure 6: Body-Diode Characteristics (Note E)

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TYPICAL ELECTRICAL CHARACTERISTICS

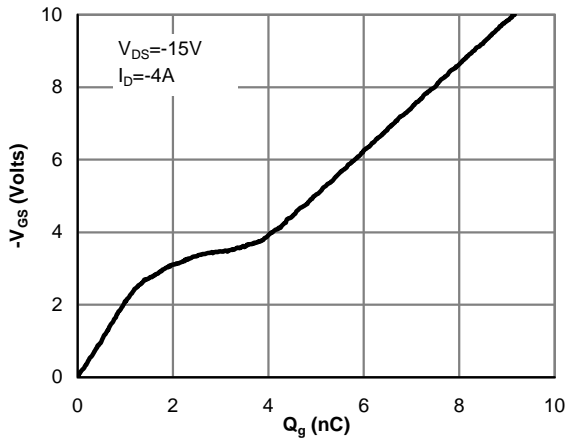


Figure 7: Gate-Charge Characteristics

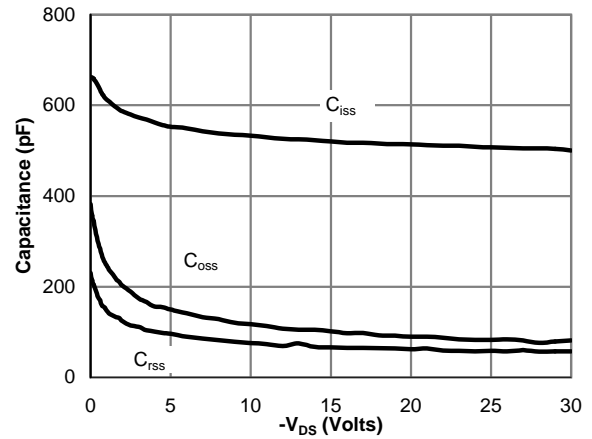


Figure 8: Capacitance Characteristics

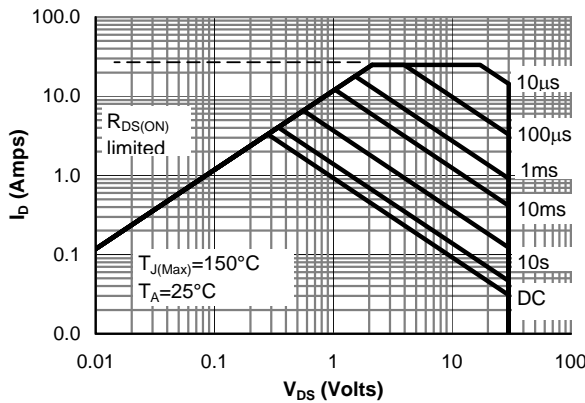


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

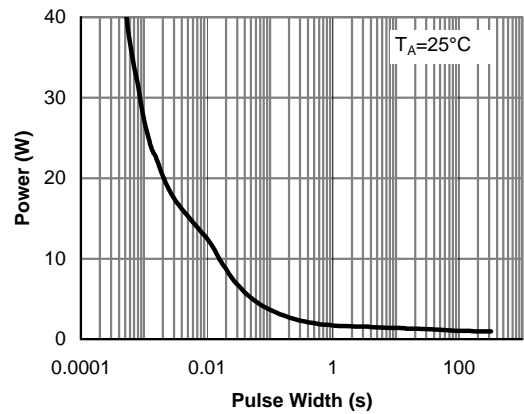


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

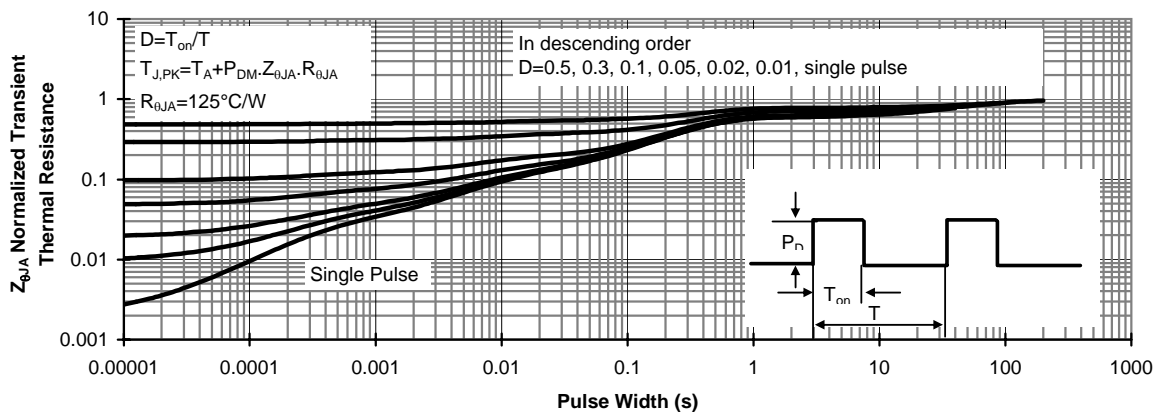
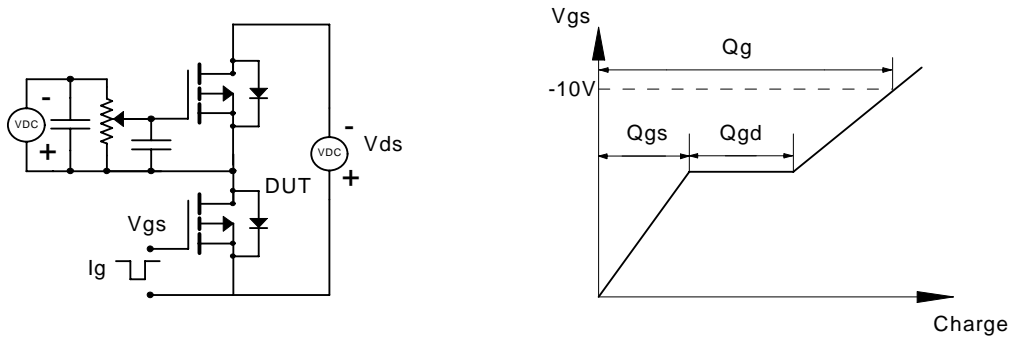


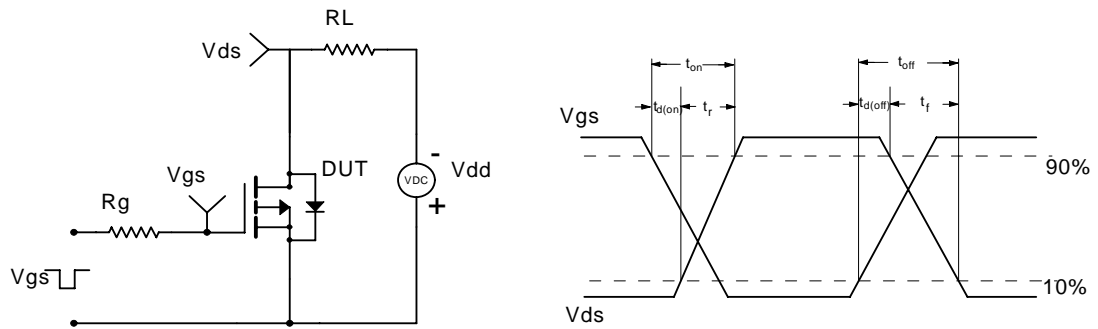
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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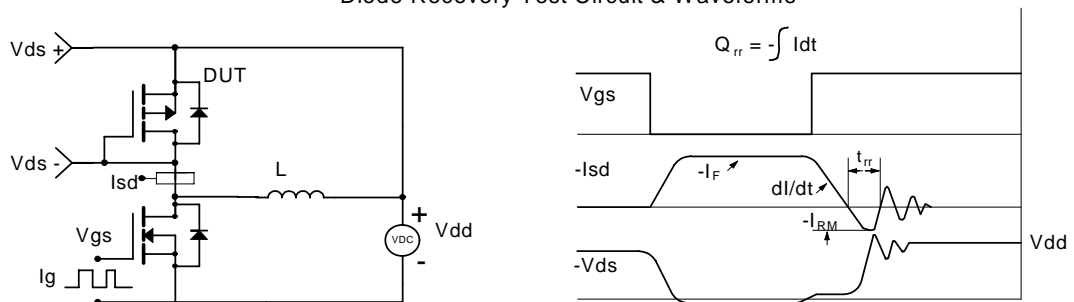
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

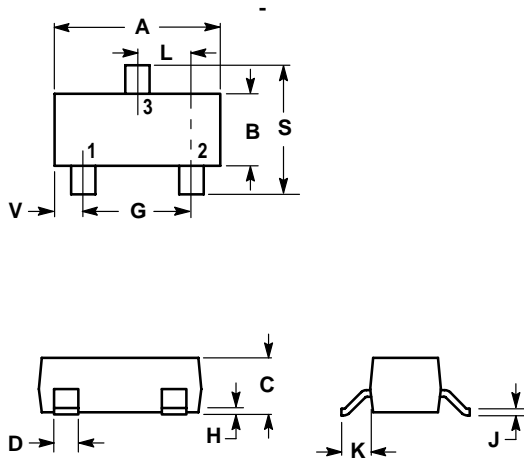


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NOTES:

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

