20V N-Channel Enhancement Mode Power MOSFET

RoHS COMPLIANT

- **Features**

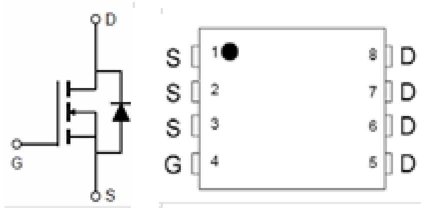
V_{DS} = 20V, I_D = 50A

$R_{DS(ON)}$ @V_{GS}= 4.5V, TYP 3.8mΩ

$R_{DS(ON)}$ @V_{GS}= 2.5V, TYP 4.3mΩ

$R_{DS(ON)}$ @V_{GS}= 1.8V, TYP 5.7mΩ

- **Pin Configurations**

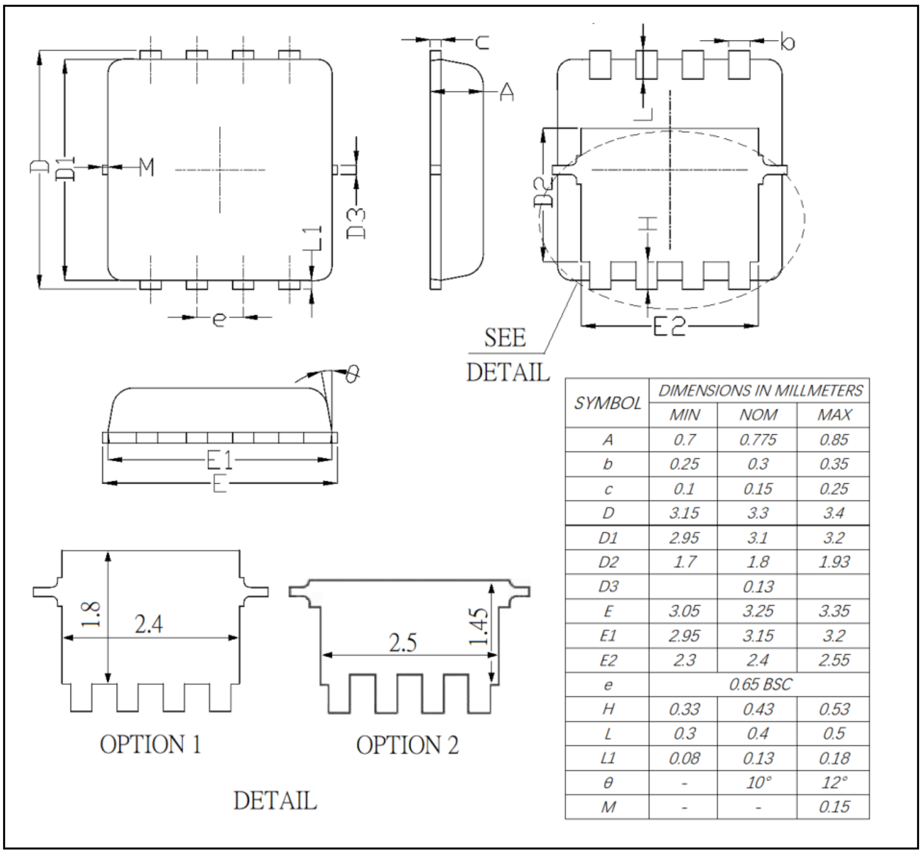


PDFN3*3

- **General Description**

LT4422FL uses advanced trench technology and desgin to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

- **Package Information**



SYMBOL	DIMENSIONS IN MILLMETERS		
	MIN	NOM	MAX
A	0.7	0.775	0.85
b	0.25	0.3	0.35
c	0.1	0.15	0.25
D	3.15	3.3	3.4
D1	2.95	3.1	3.2
D2	1.7	1.8	1.93
D3		0.13	
E	3.05	3.25	3.35
E1	2.95	3.15	3.2
E2	2.3	2.4	2.55
e		0.65 BSC	
H	0.33	0.43	0.53
L	0.3	0.4	0.5
L1	0.08	0.13	0.18
θ	-	10°	12°
M	-	-	0.15

- **Absolute Maximum Ratings** @T_A=25℃ unless otherwise noted

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DSS}	20	V
Gate-Source Voltage	V_{GSS}	±12	V

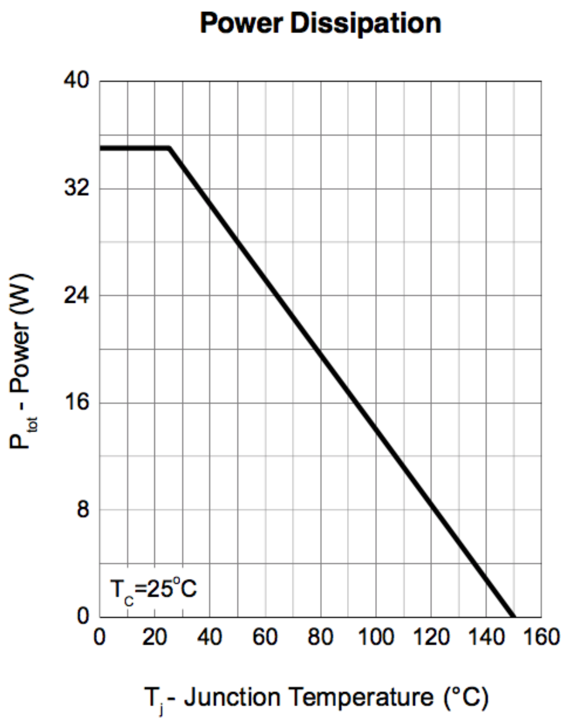
Drain Current (Continuous) *AC	T_A=25°C	I_D	50	A
	T_A=100°C		40	
Drain Current (Pulse) *B		I_{DM}	200	A
Power Dissipation	T_A=25°C	P_D	35	W
Thermal Resistance Junction to Case		$R_{θJC}$	3.5	℃/W
Thermal Resistance Junction to Ambient		$R_{θJA}$	78	℃/W
Operating Temperature/ Storage Temperature		T_J/T_{STG}	-55~150	℃

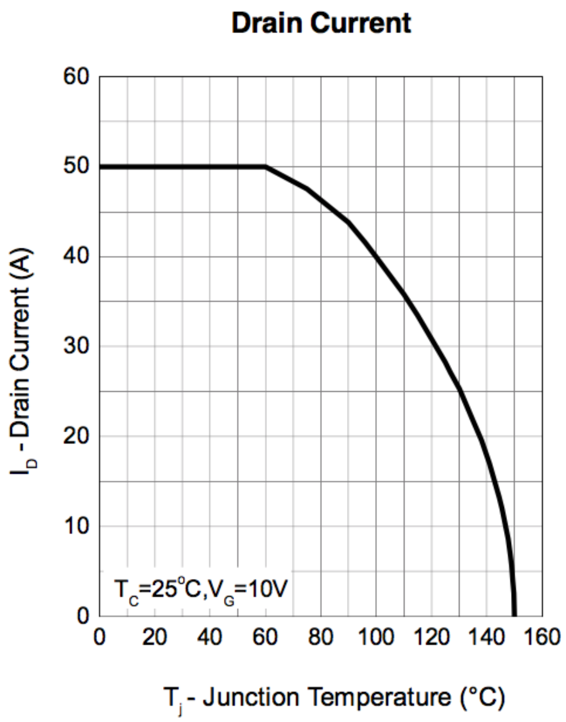
- **Electrical Characteristics** @T_A=25℃ unless otherwise noted

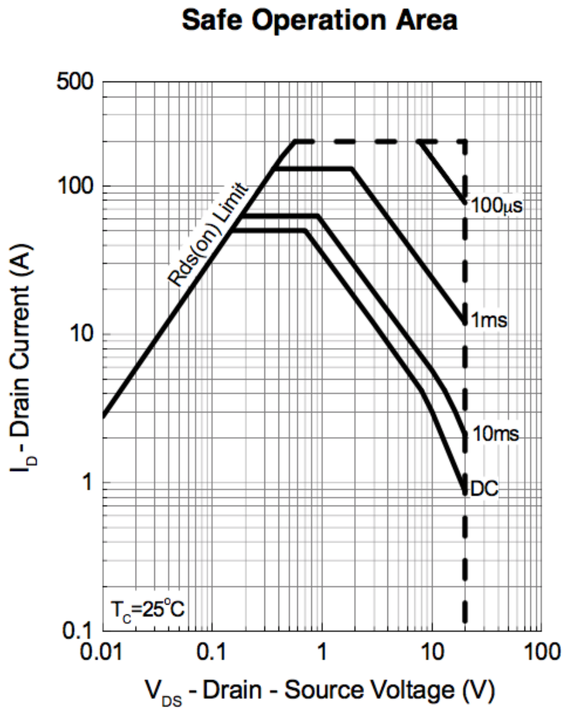
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D= 250 µA	20	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16V, V_{GS} = 0V	--	--	1	µA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_{DS}= 250 µA	0.5	0.7	1	V
Gate Leakage Current	I_{GSS}	V_{GS}= ±12V, V_{DS}=0V	--	--	±100	nA
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 13.5A	--	3.8	4.5	mΩ
	$R_{DS(on)}$	V_{GS} = 2.5V, I_D = 10A	--	4.3	5	mΩ
	$R_{DS(on)}$	V_{GS} = 1.8V, I_D = 2A	--	5.7	7	mΩ
Forward Transconductance	g_{FS}	V_{DS}= 5V, I_D= 10A	--	34	--	S
Diode Forward Voltage	V_{SD}	I_{SD}= 2A , V_{GS}=0V	--	--	1.1	V
Diode Forward Current	I_S	TC=25°C	--	--	25	A
Switching						
Total Gate Charge	Q_g	V_{DS}=10V,I_D=13.5A, V_{GS}=4.5V	--	35	--	nC
Gate-Source Charge	Q_{gs}		--	4.7	--	nC
Gate-Drain Charge	Q_{gd}		--	11.5	--	nC
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V,V_{GS}=10V, R_{GEN}=6Ω, I_D=1A	--	14	--	ns
Turn-on Rise Time	t_r		--	14.5	--	ns
Turn-off Delay Time	$t_{d(off)}$		--	130	--	ns
Turn-Off Fall Time	t_f		--	70	--	ns
Dynamic						
Input Capacitance	C_{iss}	V_{DS}=10V,V_{GS}=0V, f=1.0MHz	--	1809	--	pF
Output Capacitance	C_{oss}		--	585	--	pF
Reverse Transfer Capacitance	C_{rss}		--	386	--	pF

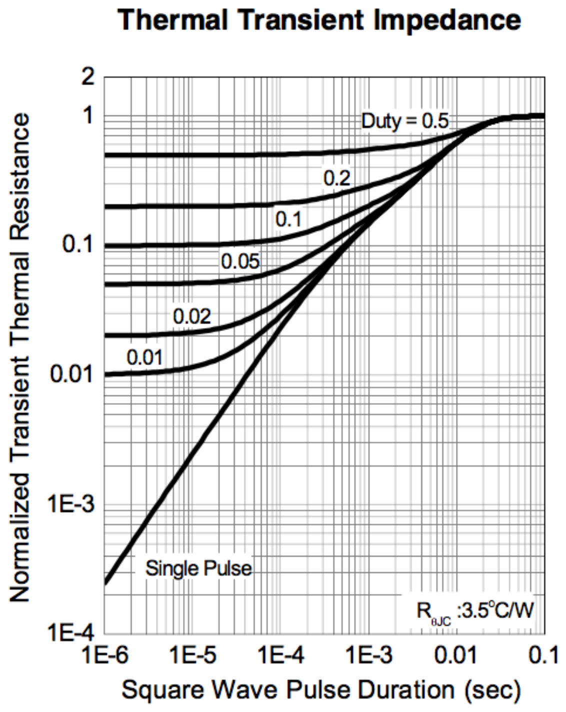
A: The value of $R_{θJA}$ is measured with the device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design. B: Repetitive rating, pulse width limited by junction temperature. C: The current rating is based on the t≤ 10s junction to ambient thermal resistance rating.

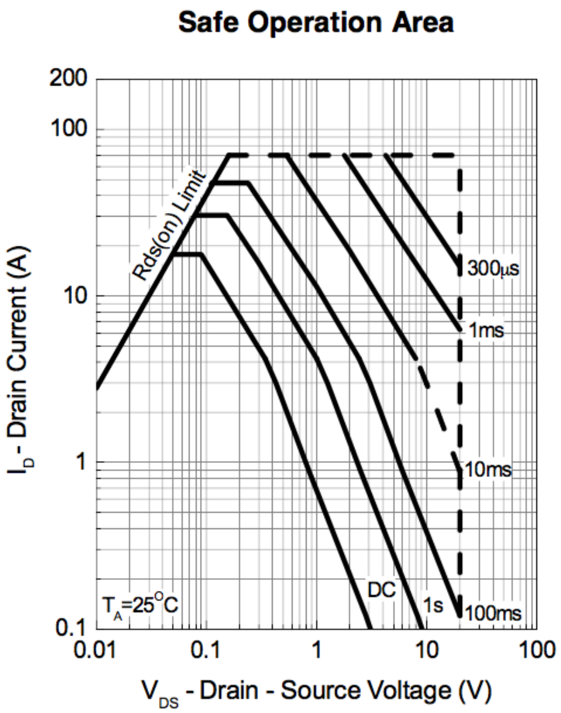
- **Typical Performance Characteristics**

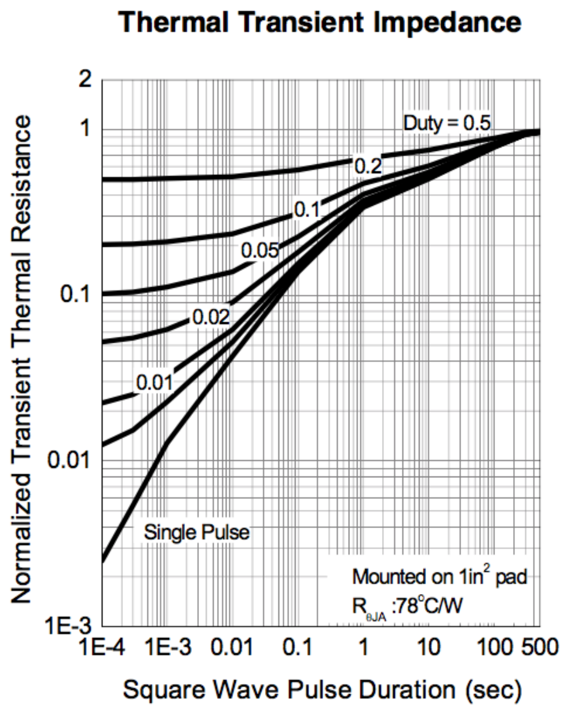


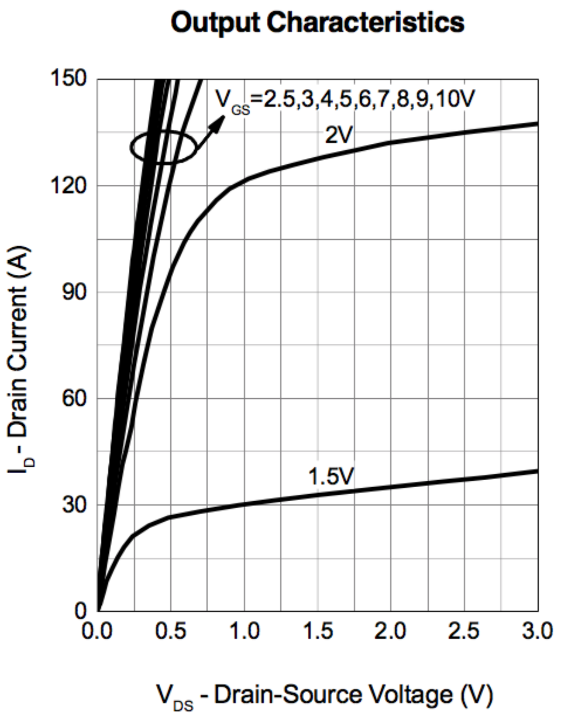


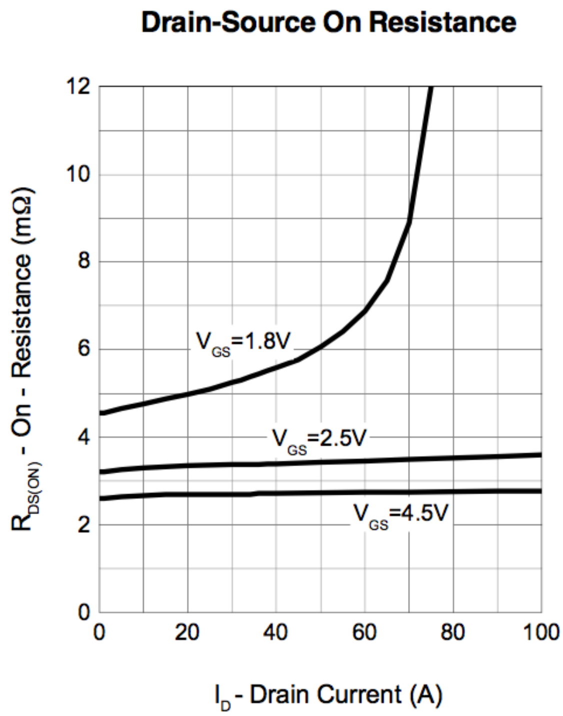




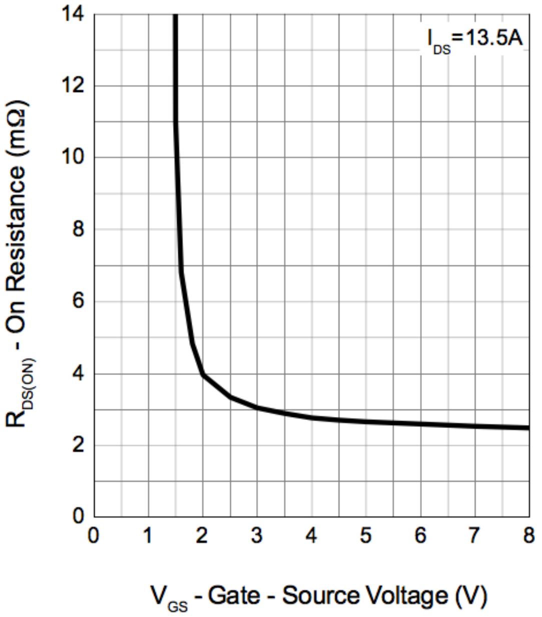

Safe Operation Area
200
100
10
1
0.1
0.01
0.1
1
10
100
Rds(on) Limit
300µs
1ms
10ms
100ms
DC
1s
T_A=25°C
I_D - Drain Current (A)
V_{DS} - Drain - Source Voltage (V)


Thermal Transient Impedance
2
1
0.1
0.01
1E-3
1E-4
1E-3
0.01
0.1
1
10
100 500
Duty = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Mounted on 1in² pad
$R_{\theta JA}$:78°C/W
Normalized Transient Thermal Resistance
Square Wave Pulse Duration (sec)

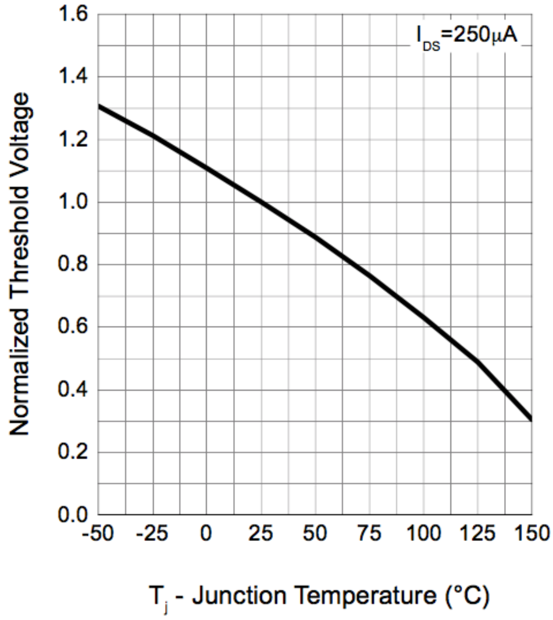

Output Characteristics
150
120
90
60
30
0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
V_{GS}=2.5,3,4,5,6,7,8,9,10V
2V
1.5V
I_D - Drain Current (A)
V_{DS} - Drain-Source Voltage (V)


Drain-Source On Resistance
12
10
8
6
4
2
0
0
20
40
60
80
100
V_{GS}=1.8V
V_{GS}=2.5V
V_{GS}=4.5V
$R_{DS(ON)}$ - On - Resistance (mΩ)
I_D - Drain Current (A)

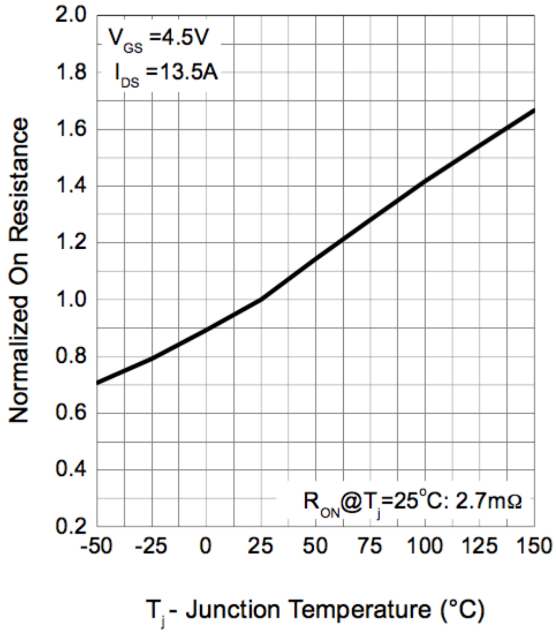
Gate-Source On Resistance



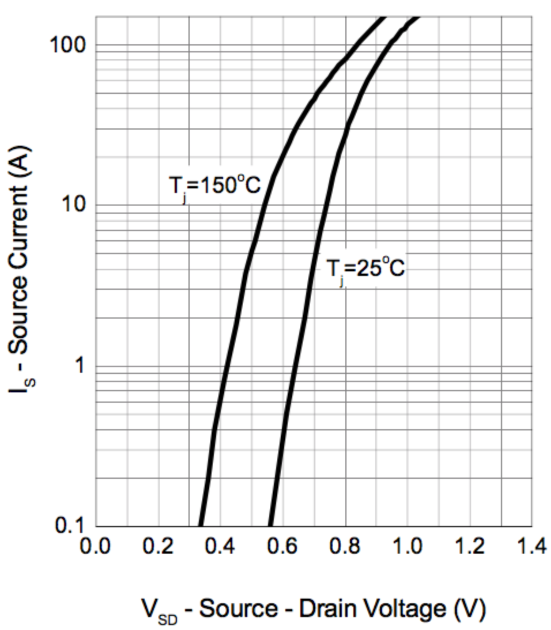
Gate Threshold Voltage

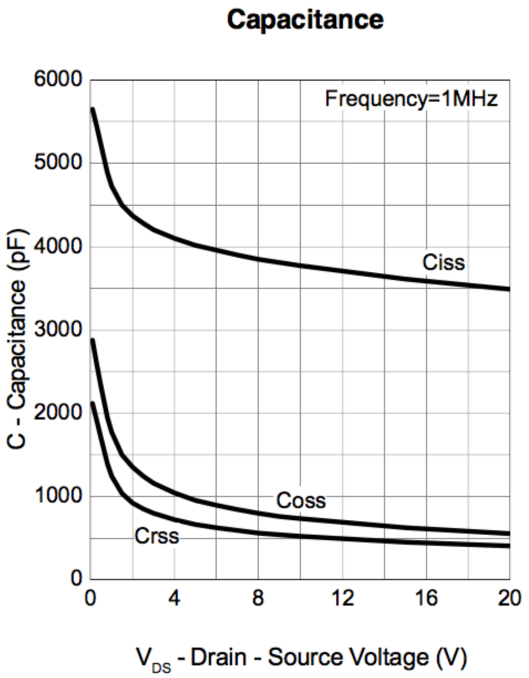


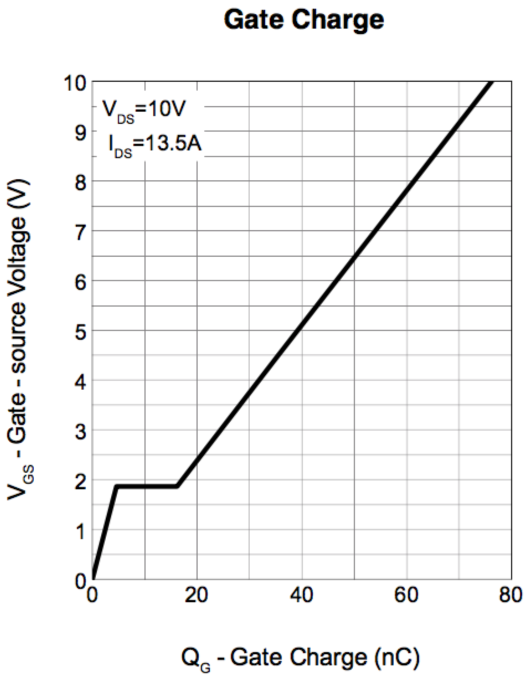
Drain-Source On Resistance



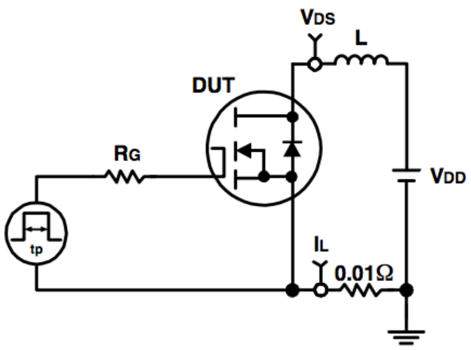
Source-Drain Diode Forward

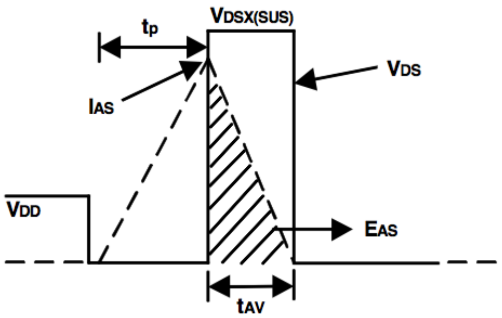



Capacitance
6000
5000
4000
3000
2000
1000
0
Frequency=1MHz
Ciss
Coss
Crss
C - Capacitance (pF)
0
4
8
12
16
20
V_{DS} - Drain - Source Voltage (V)

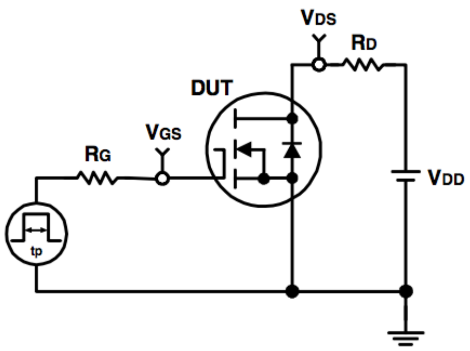

Gate Charge
10
9
8
7
6
5
4
3
2
1
0
V_{DS}=10V
I_{DS}=13.5A
V_{GS} - Gate - source Voltage (V)
0
20
40
60
80
Q_G - Gate Charge (nC)

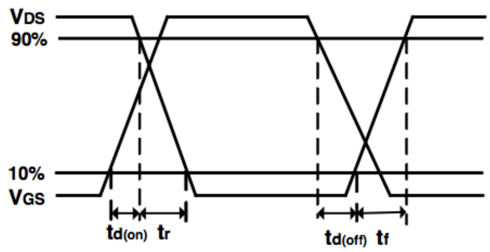
Avalanche Test Circuit and Waveforms





Switching Time Test Circuit and Waveforms





Flow (wave) soldering (solder dipping)

Product	Peak Temperature	Dipping Time
Pb device	245℃±5℃	5sec±1sec
Pb-Free device	260℃+0/-5℃	5sec±1sec

This integrated circuit can be damaged by ESD UniverChip Corporation recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedure can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

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