优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = 25°C$
150V	650mΩ @ $V_{GS} = 10V$	2.6A

Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- High avalanche energy pulse withstand capability
- Low input capacitance
- Low on-resistance
- Fast switching speed

Description and Applications

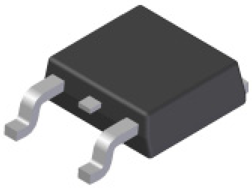
This MOSFET features low on-state resistance, fast switching and high avalanche withstand capability, making it ideal for high efficiency power management applications.

- SLIC line drivers for VoIP applications
- Transformer Driving Switch
- Power management functions
- Motor control
- Uninterrupted power supply

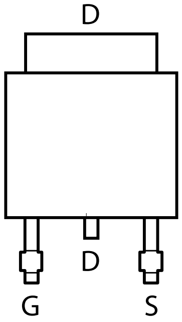
Mechanical Data

- Case: TO252-3L
- Case Material: Molded Plastic “Green” Molding Compound, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)

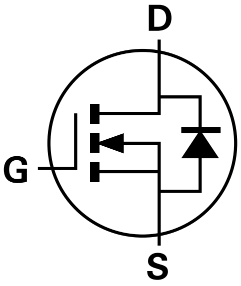
TO252-3L



Top View



Pin Out – Top View



Equivalent Circuit

Maximum Ratings @T_A = 25°C unless otherwise specified

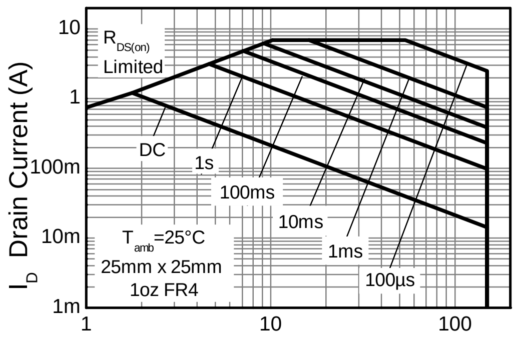
Characteristic			Symbol	Value	Unit
Drain-Source voltage			V_{DSS}	150	V
Gate-Source voltage			V_{GS}	±25	V
Single Pulsed Avalanche Energy		(Note 7)	E_{AS}	55	mJ
Single Pulsed Avalanche Energy		(Note 7)	I_{AS}	4.3	A
Repetitive Avalanche Energy		(Note 4)	E_{AR}	3.0	mJ
Repetitive Avalanche Current		(Note 4)	I_{AR}	4.3	A
Continuous Drain current	V_{GS} = 10V	(Note 3) T_A = 70°C (Note 3) (Note 2)	I_D	2.55 2.0 1.7	A
Pulsed Drain current	V_{GS} = 10V	(Note 4)	I_{DM}	17.2	A
Continuous Source current (Body diode)		(Note 2)	I_S	5.2	A
Pulsed Source current (Body diode)		(Note 4)	I_{SM}	17.2	A

Thermal Characteristics

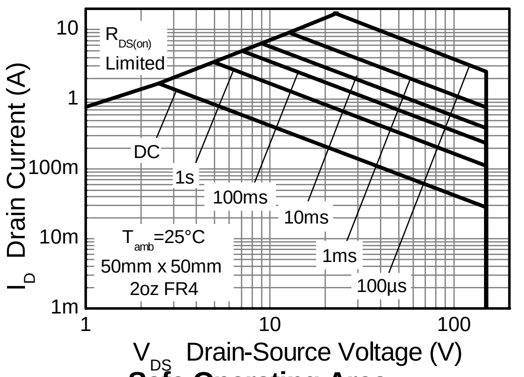
Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 2)	P_D	4.2 33.6	W mW/°C
	(Note 3)		9.5 76.0	
	(Note 6)		2.2 17.2	
Thermal Resistance, Junction to Ambient	(Note 2)	$R_{\theta JA}$	30.2	°C/W
	(Note 3)		13.1	
	(Note 6)		58.1	
Thermal Resistance, Junction to Lead	(Note 5)	$R_{\theta JL}$	2.06	°C/W
Operating and storage temperature range		T_J, T_{STG}	-55 to 150	°C

Notes:
2. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions. The device is measured when operating in a steady-state condition.
3. Same as note 2, except the device is measured at $t \leq 10$ sec.
4. Same as note 2, except the device is operating in a repetitive state with pulse width and duty cycle limited by maximum junction temperature.
5. Thermal resistance from junction to solder-point at the end of the drain lead.
6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition..
7. UIS in production with L = 5.95mH, I_{AS} = 4.3A, R_G = 25Ω, V_{DD} = 100V, starting T_J = 25°C.

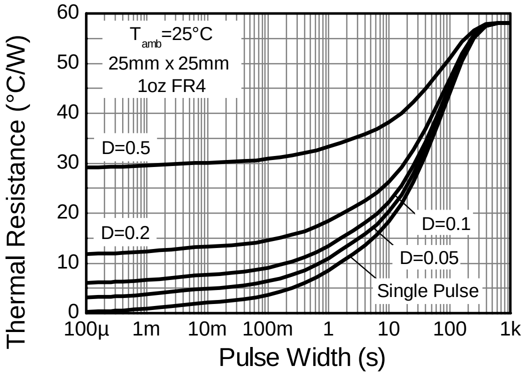
Thermal Characteristics



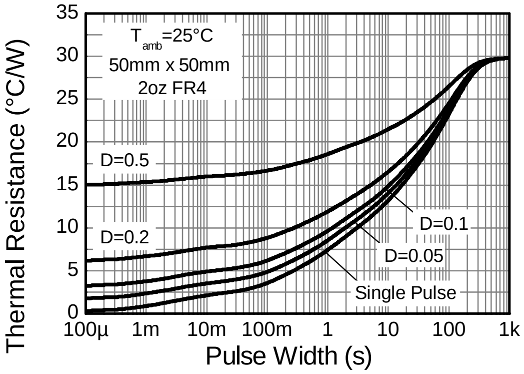
Safe Operating Area



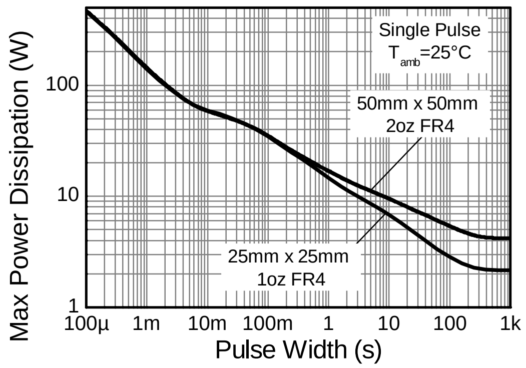
Safe Operating Area



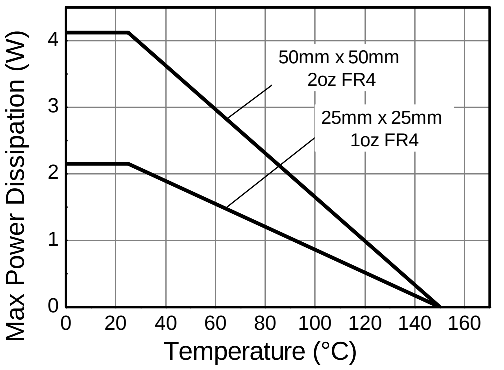
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



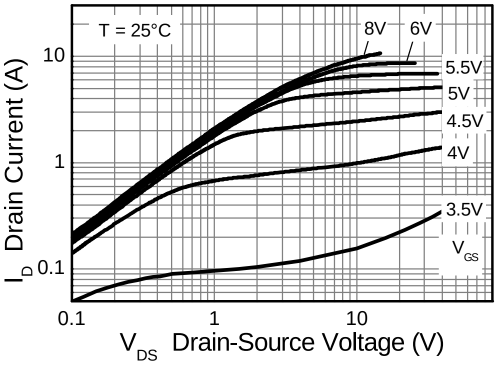
Derating Curve

Electrical Characteristics @T_A = 25°C unless otherwise specified

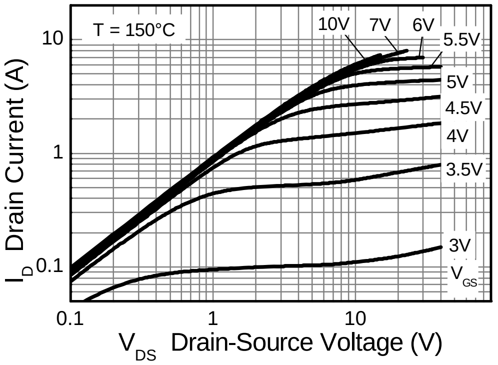
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	150	—	—	V	I_D = 250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	500	nA	V_{DS} = 150V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±25V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	2	2.7	4	V	I_D = 250µA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 8)	$R_{DS\ (ON)}$	—	0.500	0.650	Ω	V_{GS} = 10V, I_D = 2.15A
Forward Transconductance (Notes 8 & 9)	g_{fs}	—	2.8	—	S	V_{DS} = 40V, I_D = 2.15A
Diode Forward Voltage (Note 8)	V_{SD}	—	0.880	0.950	V	I_S = 4.3A, V_{GS} = 0V
Reverse recovery time (Note 9)	t_{rr}	—	153	—	ns	I_S = 5.4A, V_{GS} = 0V, di/dt = 100A/µs
Reverse recovery charge (Note 9)	Q_{rr}	—	1.1	—	µC	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	169	—	pF	V_{DS} = 25V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	64.5	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	23.3	—	pF	
Total Gate Charge	Q_g	—	6.6	—	nC	V_{DS} = 120V, V_{GS} = 10V I_D = 5.4A
Gate-Source Charge	Q_{gs}	—	1.0	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.4	—	nC	
Turn-On Delay Time (Note 10)	$t_{D(on)}$	—	3.3	—	ns	V_{DD} = 75V, V_{GS} = 10V I_D = 5.4A, $R_G \cong 25\Omega$
Turn-On Rise Time (Note 10)	t_r	—	12.7	—	ns	
Turn-Off Delay Time (Note 10)	$t_{D(off)}$	—	17.1	—	ns	
Turn-Off Fall Time (Note 10)	t_f	—	13.3	—	ns	

Notes:
8. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%
9. For design aid only, not subject to production testing.
10. Switching characteristics are independent of operating junction temperatures.

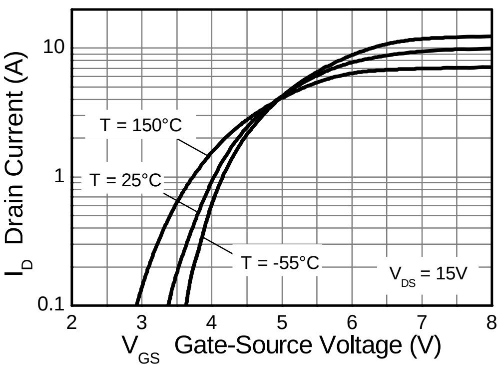
Typical Characteristics



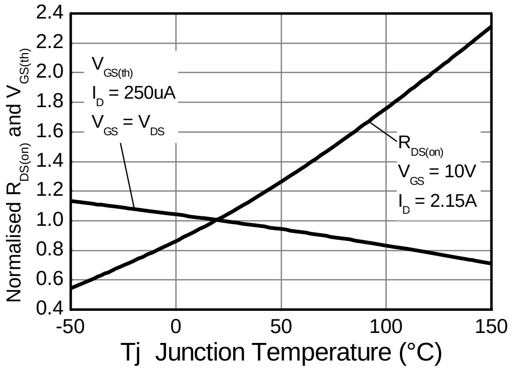
Output Characteristics



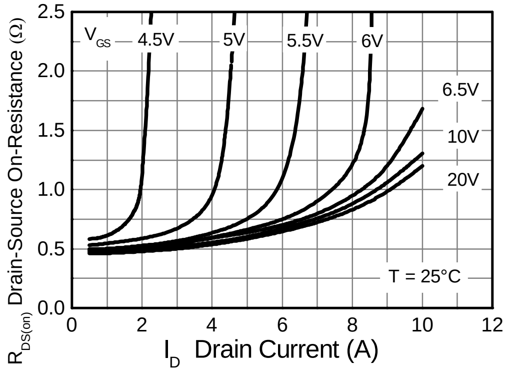
Output Characteristics



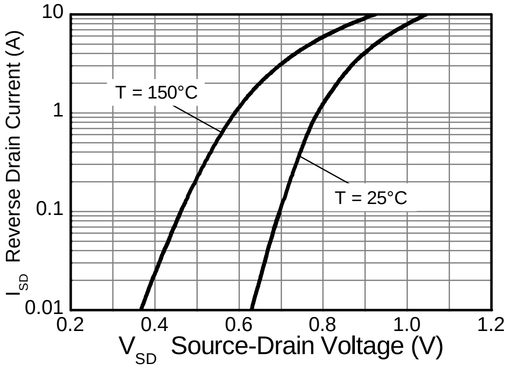
Typical Transfer Characteristics



Normalised Curves v Temperature

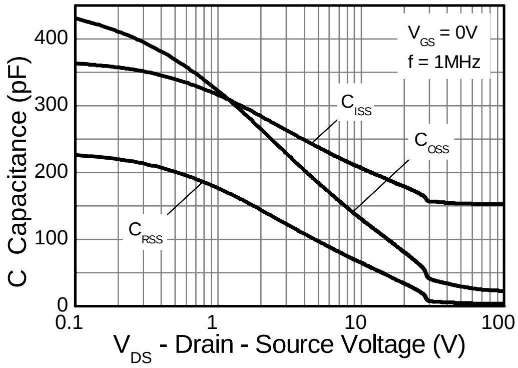


On-Resistance v Drain Current

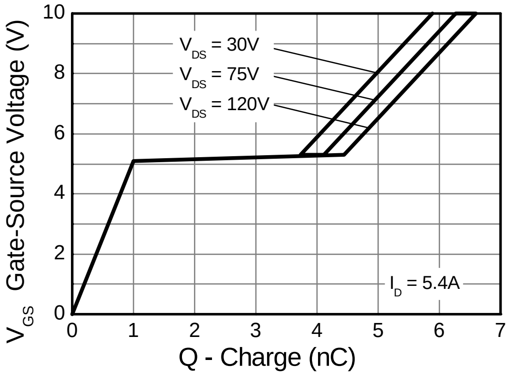


Source-Drain Diode Forward Voltage

Typical Characteristics - continued

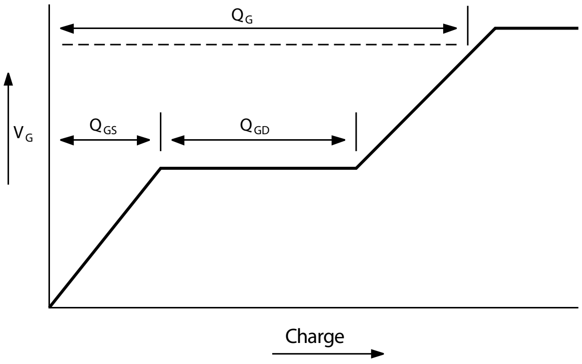


Capacitance v Drain-Source Voltage

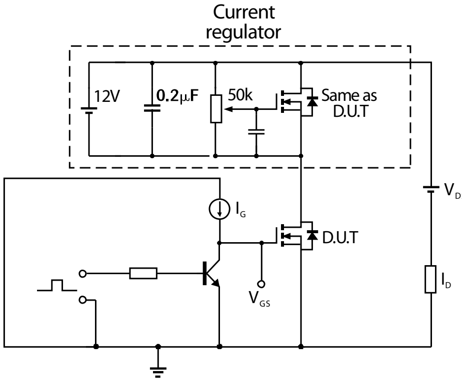


Gate-Source Voltage v Gate Charge

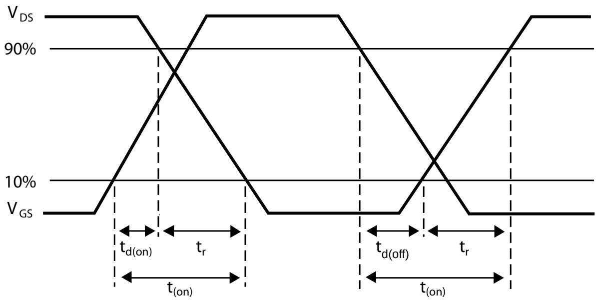
Test Circuits



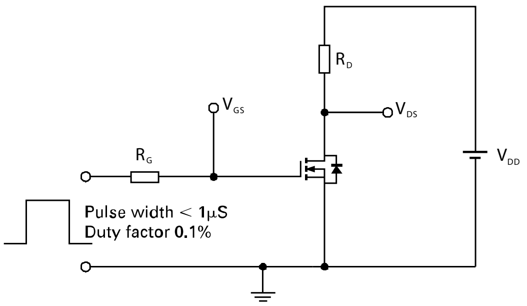
Basic gate charge waveform



Gate charge test circuit

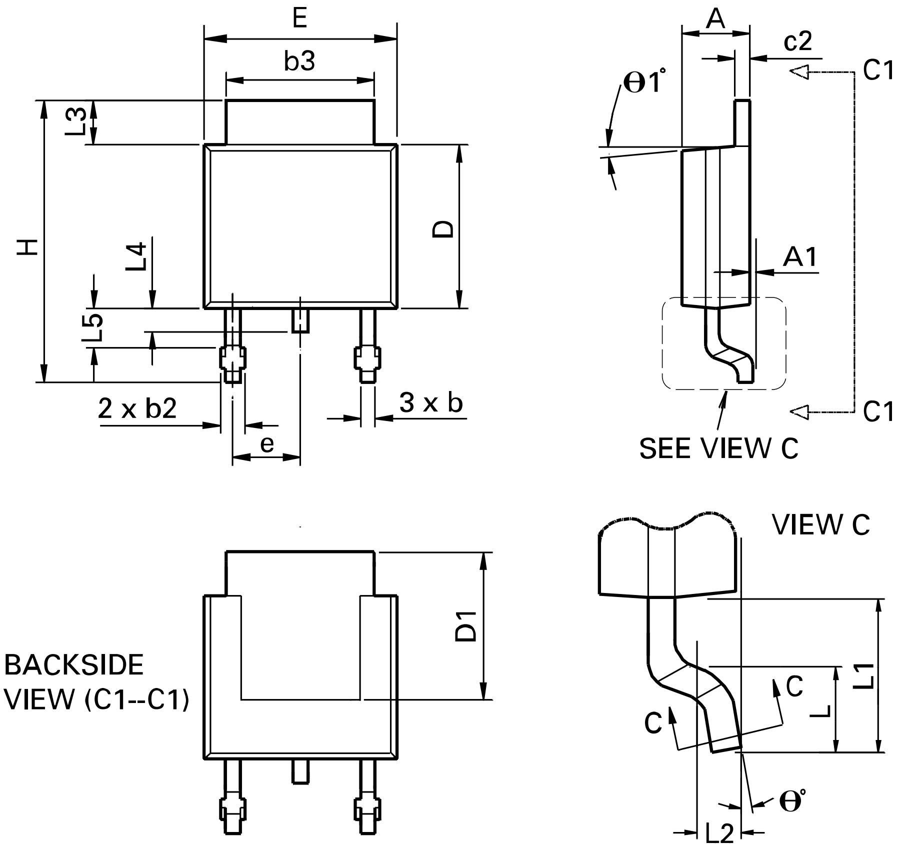


Switching time waveforms



Switching time test circuit

Package Outline Dimensions



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
A	0.086	0.094	2.18	2.39	**e**	0.090 BSC		2.29 BSC	
A1	-	0.005	-	0.127	**H**	0.370	0.410	9.40	10.41
b	0.020	0.035	0.508	0.89	**L**	0.055	0.070	1.40	1.78
b2	0.030	0.045	0.762	1.14	**L1**	0.108 REF		2.74 REF	
b3	0.205	0.215	5.21	5.46	**L2**	0.020 BSC		0.508 BSC	
c	0.018	0.024	0.457	0.61	**L3**	0.035	0.065	0.89	1.65
c2	0.018	0.023	0.457	0.584	**L4**	0.025	0.040	0.635	1.016
D	0.213	0.245	5.41	6.22	**L5**	0.045	0.060	1.14	1.52
D1	0.205	-	5.21	-	**θ1°**	0°	10°	0°	10°
E	0.250	0.265	6.35	6.73	**θ°**	0°	15°	0°	15°
E1	0.170	-	4.32	-	-	-	-	-	-

Suggested Pad Layout