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
-100V	350mΩ @ V_{GS}= -10V	-3.9A
	450mΩ @ V_{GS}= -6.0V	-3.4A

Features and Benefits

- Fast Switching Speed
- Low Gate Drive
- Low Input Capacitance

Description and Applications

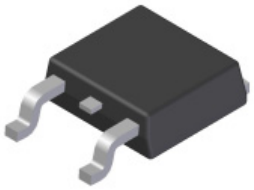
This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Motor Control
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

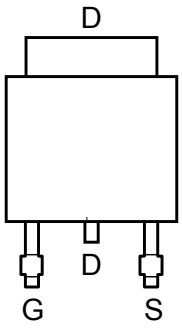
Mechanical Data

- Case: TO252
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (approximate)

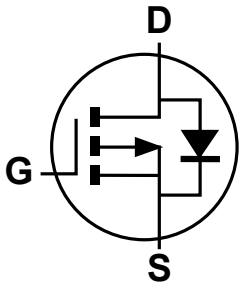
TO252



Top View



Pin Out – Top View



Equivalent Circuit

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

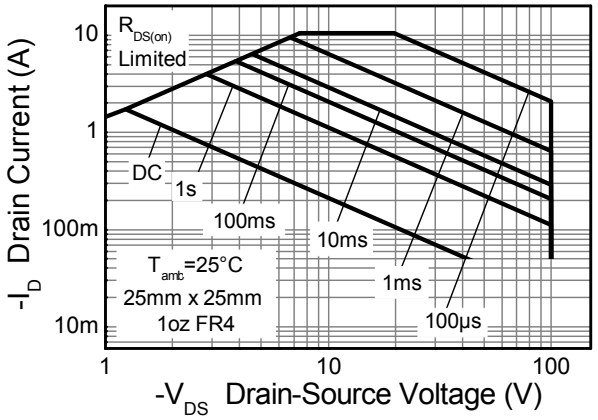
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-100	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain current	V_{GS} = 10V	(Note 6)	I_D	-3.9	A
		T_A = +70°C (Note 6)		-3.1	
		(Note 5)		-2.4	
Pulsed Drain current	V_{GS}= 10V	(Note 7)	I_{DM}	-11.3	A
Continuous Source Current (Body diode)		(Note 6)	I_S	-8.7	A
Pulsed Source Current (Body diode)		(Note 7)	I_{SM}	-11.3	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

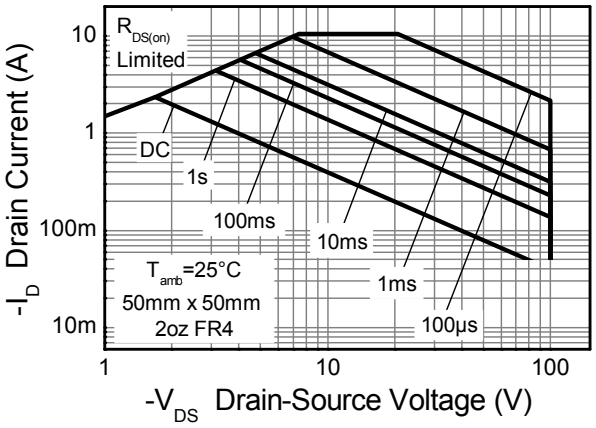
Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 5)	P_D	4.0 32.0	W mW/°C
	(Note 6)		10.2 80.8	
	(Note 9)		2.0 16.1	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	31	°C/W
	(Note 6)		12.3	
	(Note 9)		62	
Thermal Resistance, Junction to Case	(Note 8)	$R_{\theta JL}$	2.4	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Notes:
5. 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.
6. Same as note (1), except the device is measured at t ≤ 10 sec.
7. Same as note (1), except the device is pulsed with D= 0.02 and pulse width 300μs. The pulse current is limited by the maximum junction temperature.
8. Thermal resistance from junction to solder-point (at the end of the drain lead).
9. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.

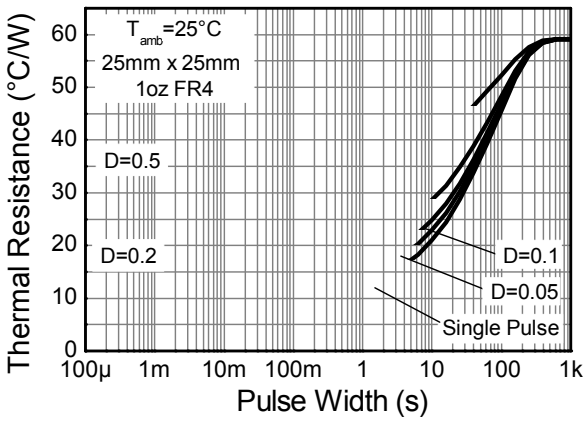
Thermal Characteristics



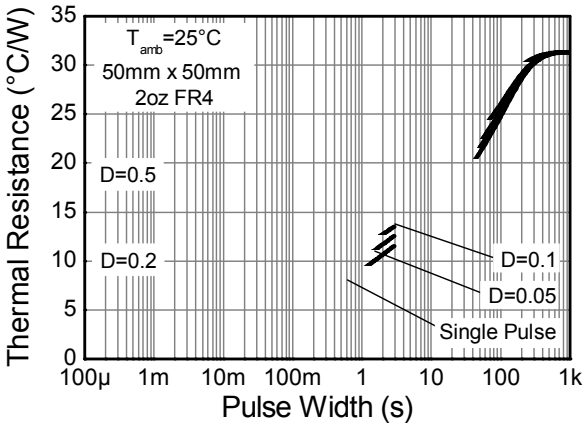
Safe Operating Area



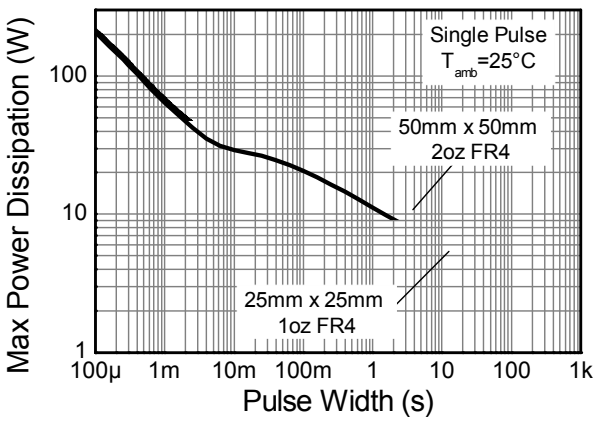
Safe Operating Area



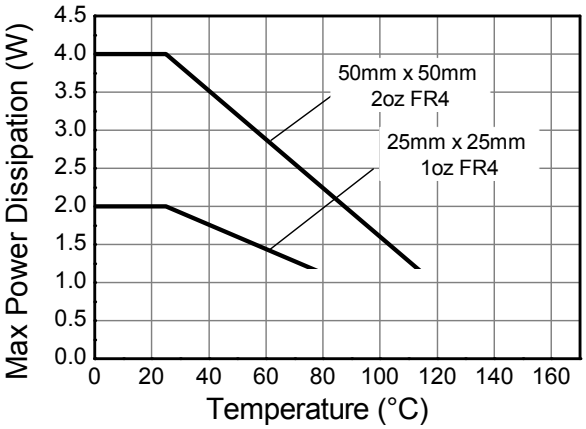
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



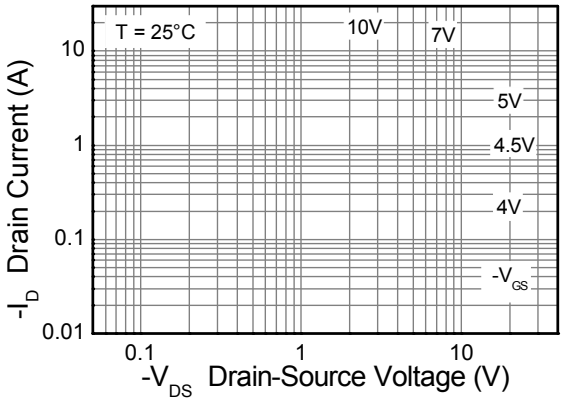
Derating Curve

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

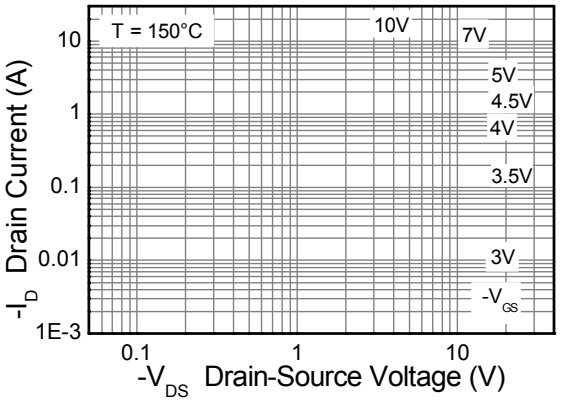
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-100	—	—	V	I_D = -250μA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-0.5	μA	V_{DS} = -100V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	-2.0	—	-4.0	V	I_D = -250μA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 10)	$R_{DS(ON)}$	—	—	0.350	Ω	V_{GS} = -10V, I_D = -1.4A
				0.450		V_{GS} = -6V, I_D= -1.2A
Forward Transconductance (Notes 10 & 11)	g_{fs}	—	2.8	—	S	V_{DS} = -15V, I_D = -1.4A
Diode Forward Voltage (Note 10)	V_{SD}	—	-0.85	-0.95	V	I_S = -1.7A, V_{GS}= 0V
Reverse recovery time (Note 11)	t_{rr}		33	—	ns	I_S = -1.5A, di/dt = 100A/μs
Reverse recovery charge (Note 11)	Q_{rr}	—	48	—	nC	
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C_{iss}	—	424	—	pF	V_{DS} = -50V, V_{GS} = 0V F = 1MHz
Output Capacitance	C_{oss}	—	36.6	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	29.8	—	pF	
Total Gate Charge (Note 12)	Q_g	—	7.1	—	nC	V_{GS} = -6.0V; V_{DS} = -50V, I_D = -1.4A
Total Gate Charge (Note 12)	Q_g	—	10.7	—	nC	V_{GS} = -10V; V_{DS} = -50V, I_D = -1.4A
Gate-Source Charge (Note 12)	Q_{gs}	—	1.7	—	nC	
Gate-Drain Charge (Note 12)	Q_{gd}	—	3.8	—	nC	
Turn-On Delay Time (Note 12)	$t_{D(on)}$	—	3.0	—	ns	V_{DD} = -50V, V_{GS} = -10V I_D = -1A, $R_G \cong 6.0\Omega$
Turn-On Rise Time (Note 12)	t_r	—	3.5	—	ns	
Turn-Off Delay Time (Note 12)	$t_{D(off)}$	—	13.4	—	ns	
Turn-Off Fall Time (Note 12)	t_f	—	7.2	—	ns	

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

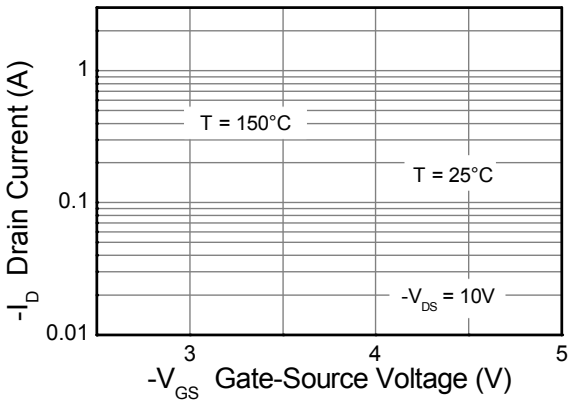
Typical Characteristics



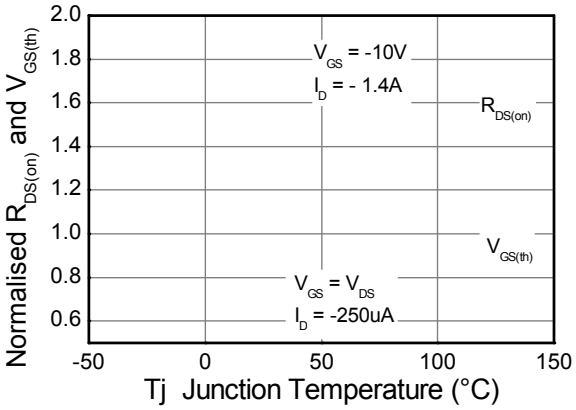
Output Characteristics



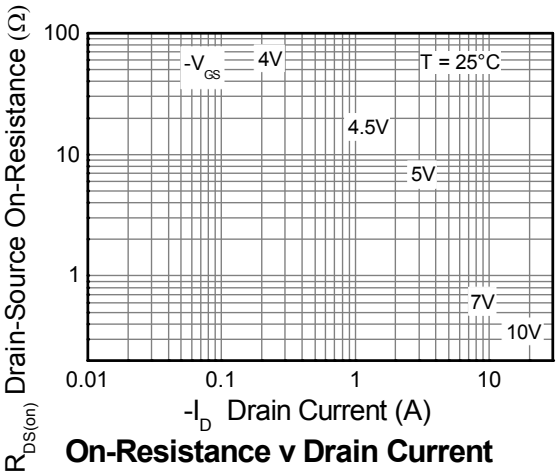
Output Characteristics



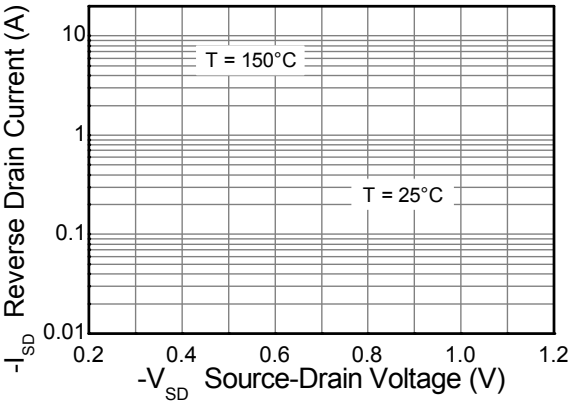
Typical Transfer Characteristics



Normalised Curves v Temperature

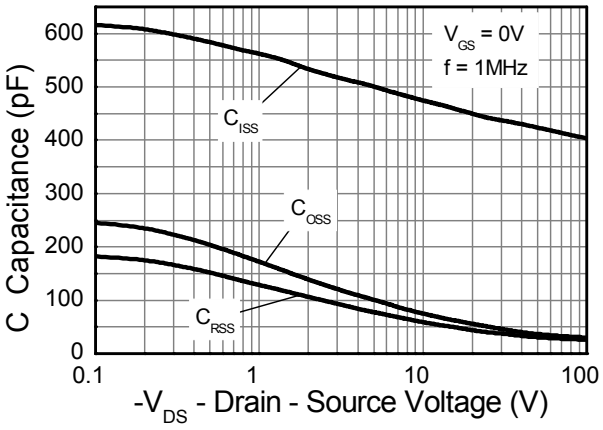


On-Resistance v Drain Current

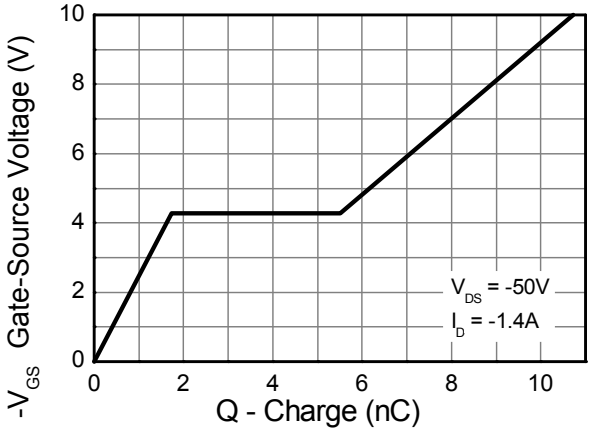


Source-Drain Diode Forward Voltage

Typical Characteristics (cont.)

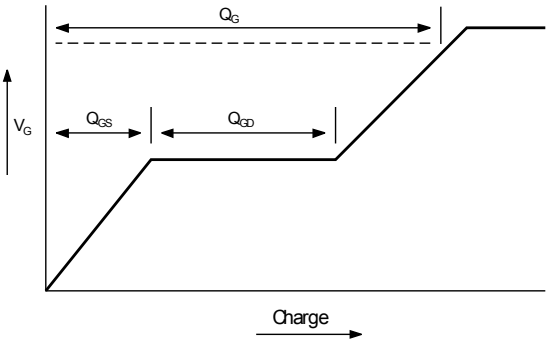


Capacitance v Drain-Source Voltage

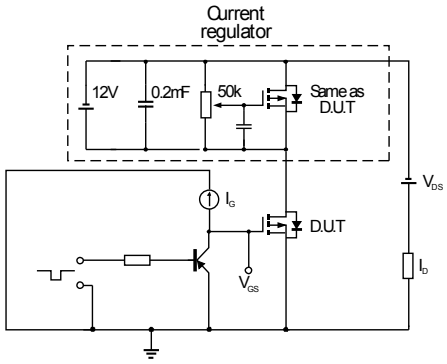


Gate-Source Voltage v Gate Charge

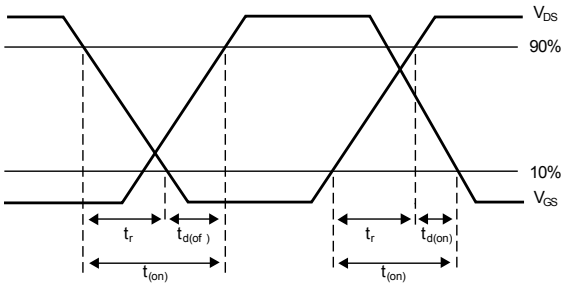
Test Circuits



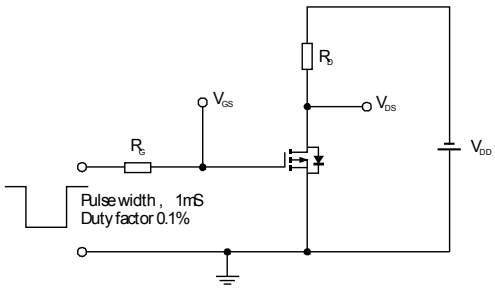
Basic gate charge waveform



Gate charge test circuit

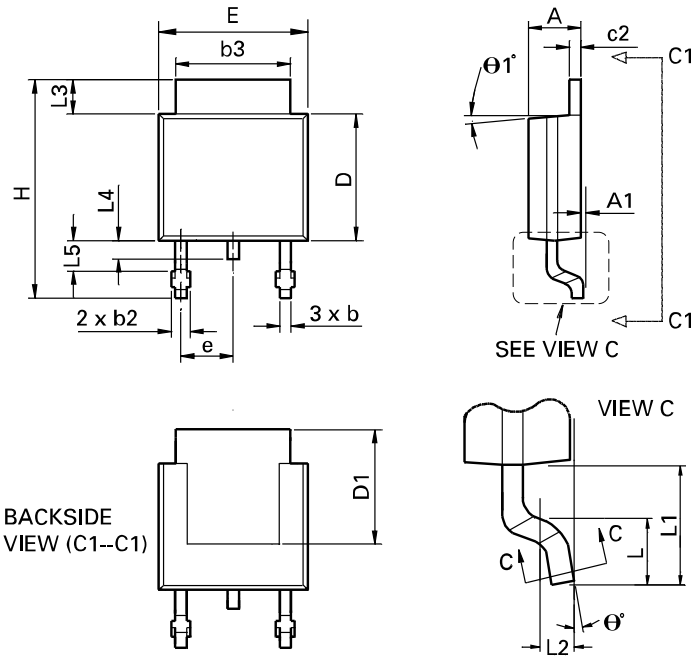


Switching time waveforms



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