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

BV_{DSS}	Max $R_{DS(on)}$	**Max I_D** **T_A = +25°C** **(Note 4)**
60V	40mΩ @ V_{GS} = 10V	7.7A
	60mΩ @ V_{GS} = 4.5V	6.3A

Description and Applications

This MOSFET is designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

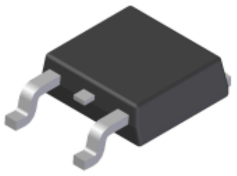
Features and Benefits

- Low On-Resistance
- Fast Switching Speed
- Low Gate Drive

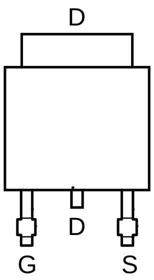
Mechanical Data

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish. Solderable per MIL-STD-202, Method 208 ⓔ3
- Weight: 0.33 grams (Approximate)

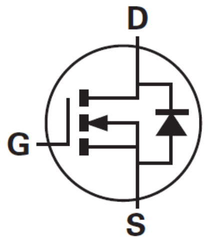
TO252



Top View



Pin Out -Top View



Equivalent Circuit

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

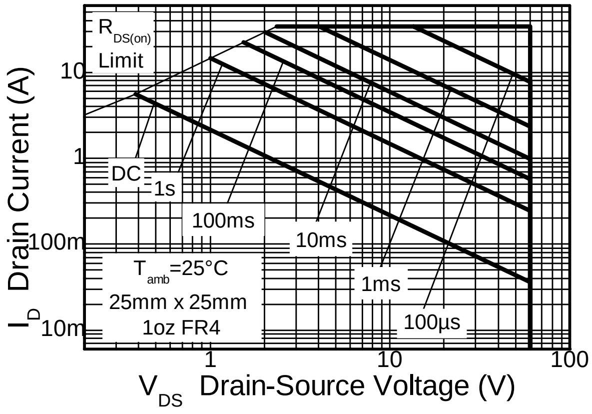
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain Current	V_{GS} = 10V	(Note 6)	I_D	11.8	A
		T_A = +70°C (Note 6)		9.6	
		(Note 5)		7.7	
Pulsed Drain Current		(Note 7)	I_{DM}	43	A
Continuous Source Current (Body Diode)		(Note 6)	I_S	10.8	A
Pulsed Source Current (Body Diode)		(Note 7)	I_{SM}	43	A

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

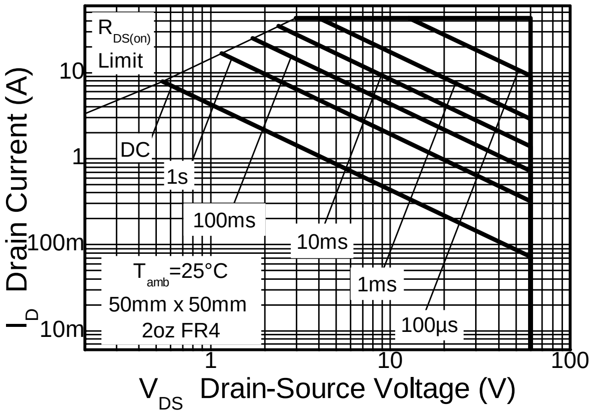
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 5)	P_D	4.3 34.4	W mW/°C
	(Note 6)		10.1 80.8	
	(Note 8)		2.15 17.2	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	29	°C/W
	(Note 6)		12.3	
	(Note 8)		58.1	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	1.04	
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. For a device surface mounted on FR4 PCB measured at $t \leq 10$ sec.
7. Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, D = 0.02 and pulse width 300 µs. The pulse current is limited by the maximum junction temperature.
8. 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.
9. Thermal resistance from junction to solder-point (at the end of the drain lead).

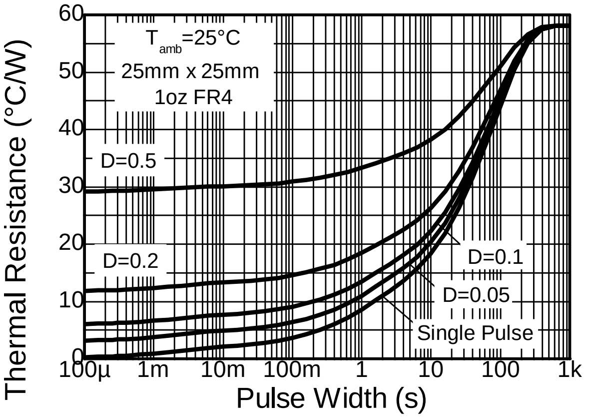
Thermal Characteristics



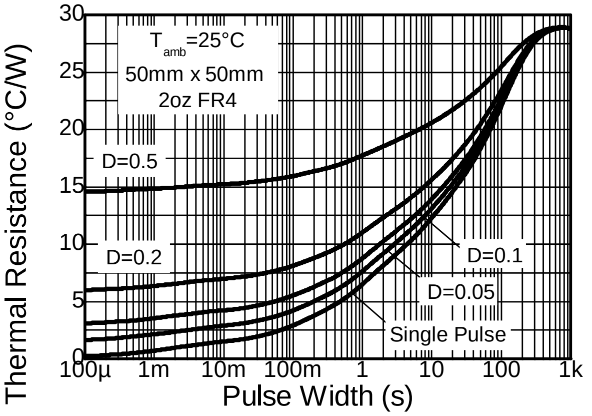
Safe Operating Area



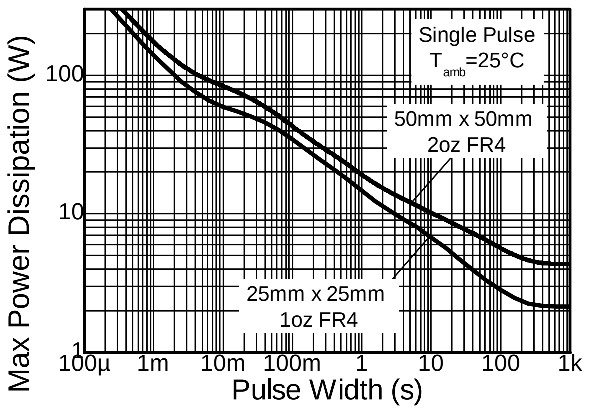
Safe Operating Area



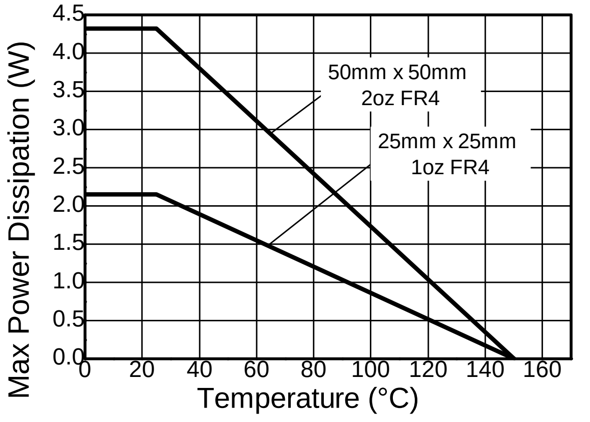
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



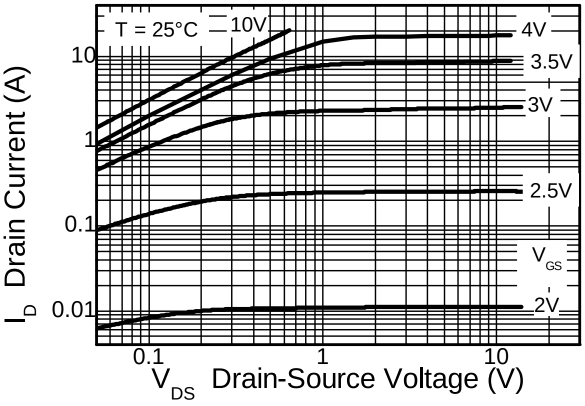
Derating Curve

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

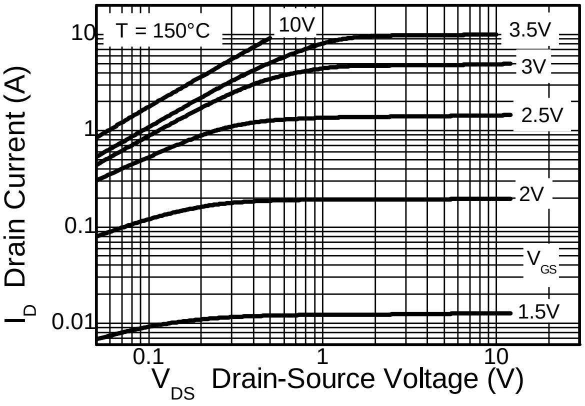
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	I_D = 250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	I_D = 250µA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 10)	$R_{DS\ (ON)}$	—	—	40	mΩ	V_{GS} = 10V, I_D = 7.3A
				60		V_{GS} = 4.5V, I_D = 5.6A
Forward Transconductance (Notes 10 & 11)	g_{fs}	—	15	—	S	V_{DS} = 15V, I_D = 7.3A
Diode Forward Voltage (Note 10)	V_{SD}	—	0.85	0.95	V	I_S = 6.6A, V_{GS} = 0V, T_J = +25°C
Reverse Recovery Time (Note 11)	t_{rr}		25.6	—	ns	I_S = 3A, di/dt = 100A/µs
Reverse Recovery Charge (Note 11)	Q_{rr}	—	26.0	—	nC	T_J = +25°C
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C_{iss}	—	1426	—	pF	V_{DS} = 30V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	134	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	64	—	pF	
Total Gate Charge (Note 12)	Q_g	—	15	—	nC	V_{GS} = 4.5V, V_{DS} = 30V, I_D = 5.6A
Total Gate Charge (Note 12)	Q_g	—	29	—	nC	V_{GS} = 10V, V_{DS} = 30V I_D = 7.3A
Gate-Source Charge (Note 12)	Q_{gs}	—	7.0	—	nC	
Gate-Drain Charge (Note 12)	Q_{gd}	—	4.7	—	nC	
Turn-On Delay Time (Note 12)	$t_{D(on)}$	—	4.8	—	ns	V_{DD} = 30V, V_{GS} = 10V I_D = 1A, R_G ≅ 6.0Ω
Turn-On Rise Time (Note 12)	t_r	—	4.6	—	ns	
Turn-Off Delay Time (Note 12)	$t_{D(off)}$	—	32.5	—	ns	
Turn-Off Fall Time (Note 12)	t_f	—	14.5	—	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.

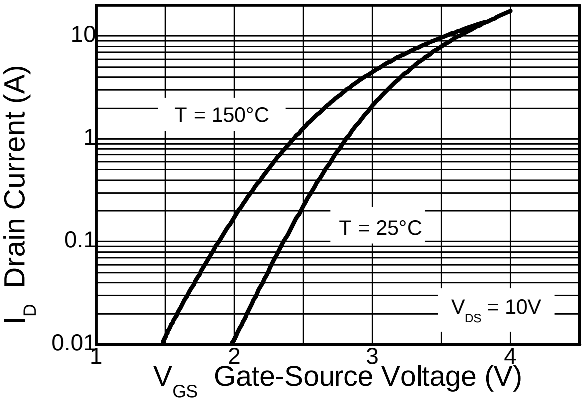
Typical Characteristics



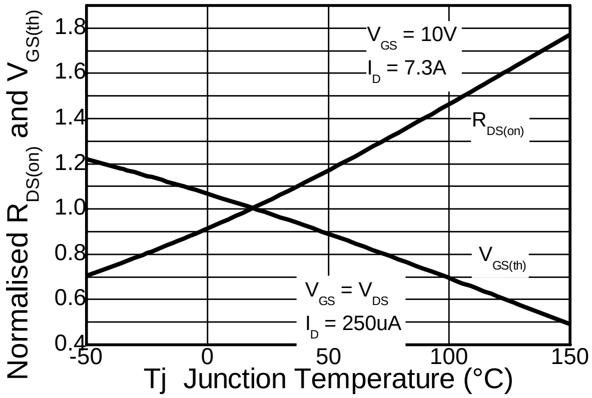
Output Characteristics



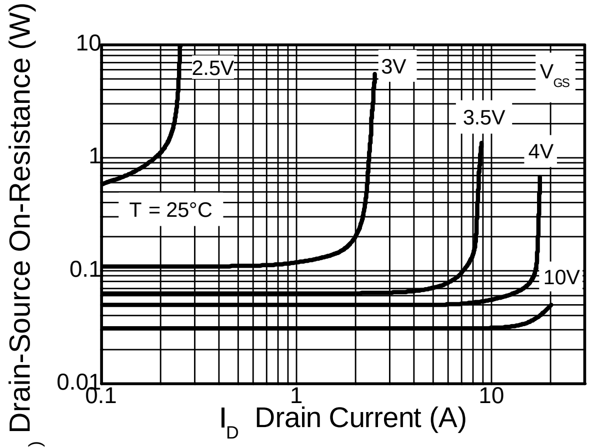
Output Characteristics



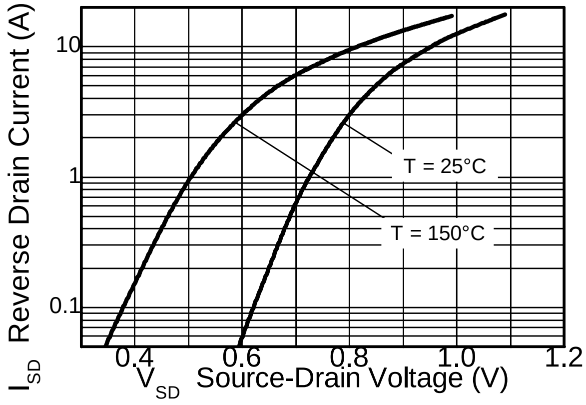
Typical Transfer Characteristics



Normalised Curves v Temperature

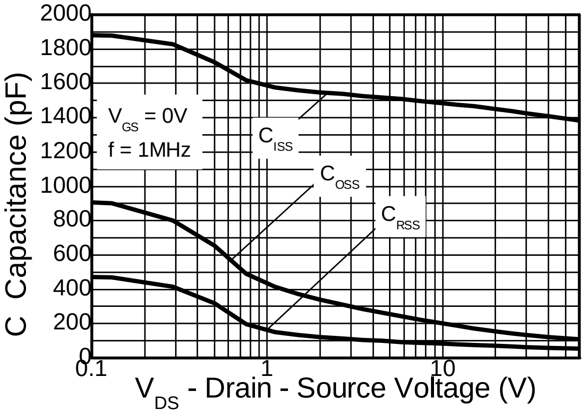


On-Resistance v Drain Current

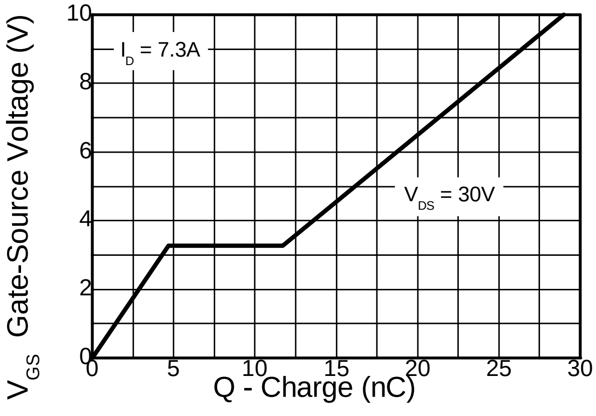


Source-Drain Diode Forward Voltage

Typical Characteristics (cont.)

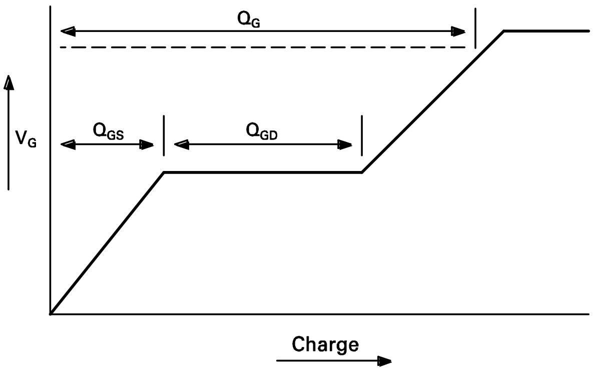


Capacitance v Drain-Source Voltage

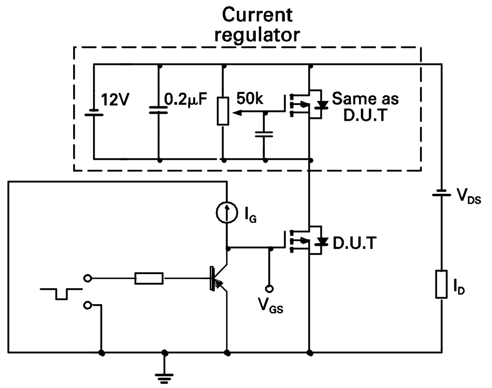


Gate-Source Voltage v Gate Charge

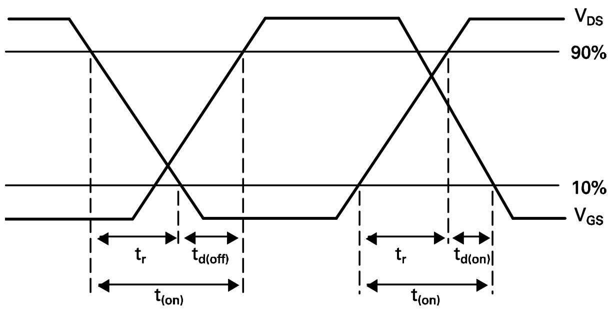
Test Circuits



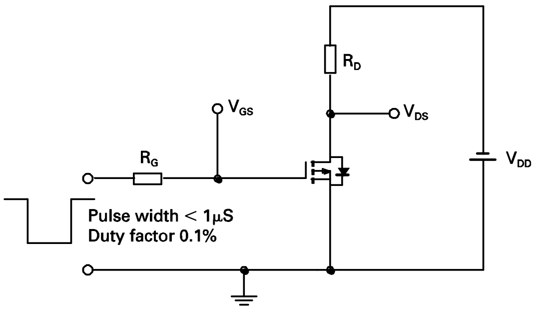
Basic gate charge waveform



Gate charge test circuit

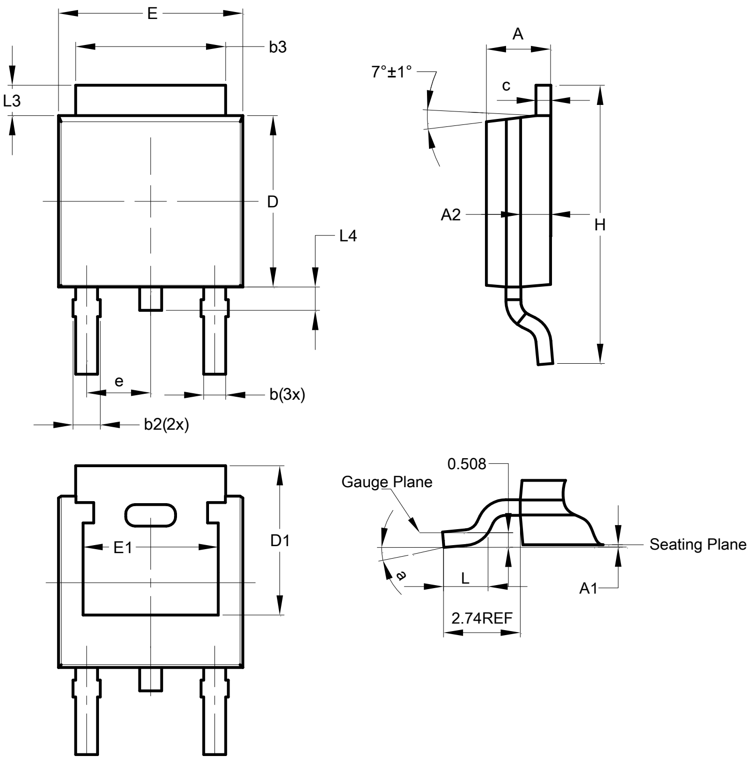


Switching time waveforms



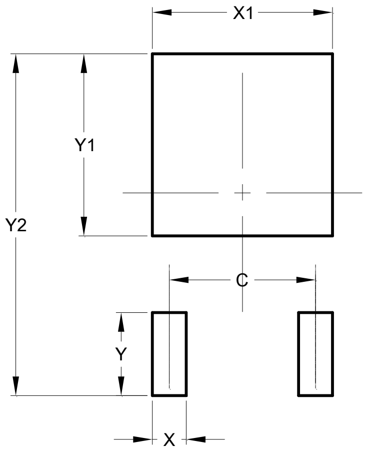
Switching time test circuit

Package Outline Dimensions



TO252 (DPAK)			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700