

## 250V P-CHANNEL ENHANCEMENT MODE MOSFET

### SUMMARY

**$V_{(BR)DSS}=-250V$ ;  $R_{DS(ON)}=14\Omega$ ;  $I_D=-205mA$**

### DESCRIPTION

This 250V enhancement mode P-channel MOSFET provides users with a competitive specification offering efficient power handling capability, high impedance and is free from thermal runaway and thermally induced secondary breakdown. Applications benefiting from this device include a variety of Telecom and general high voltage switching circuits.

SOT223 and SOT23-6 versions are also available.

### FEATURES

- High voltage
- Low on-resistance
- Fast switching speed
- Low gate drive
- Low threshold
- Complementary N-channel Type ZVN4525Z
- SOT89 package

### APPLICATIONS

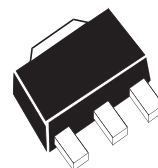
- Earth Recall and dialling switches
- Electronic hook switches
- High Voltage Power MOSFET Drivers
- Telecom call routers
- Solid state relays

### ORDERING INFORMATION

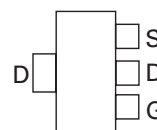
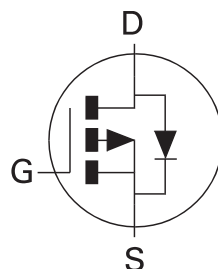
DEVICE	REEL SIZE (inches)	TAPE WIDTH (mm)	QUANTITY PER REEL
ZVP4525ZTA	7	8mm embossed	1000 units
ZVP4525ZTC	13	8mm embossed	4000 units

### DEVICE MARKING

- P52



**SOT89**



Top View

# ZVP4525Z

## ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DSS}$	250	V
Gate Source Voltage	$V_{GS}$	$\pm 40$	V
Continuous Drain Current ( $V_{GS}=10V$ ; $T_A=25^\circ C$ )(a) ( $V_{GS}=10V$ ; $T_A=70^\circ C$ )(a)	$I_D$ $I_D$	-205 -164	mA mA
Pulsed Drain Current (c)	$I_{DM}$	-1	A
Continuous Source Current (Body Diode)	$I_S$	-0.75	A
Pulsed Source Current (Body Diode)	$I_{SM}$	-1	A
Power Dissipation at $T_A=25^\circ C$ (a)	$P_D$	1.2	W
Linear Derating Factor		9.6	mW/ $^\circ C$
Operating and Storage Temperature Range	$T_j, T_{stg}$	-55 to +150	$^\circ C$

## THERMAL RESISTANCE

PARAMETER	SYMBOL	VALUE	UNIT
Junction to Ambient (a)	$R_{\theta JA}$	103	$^\circ C/W$
Junction to Ambient (b)	$R_{\theta JA}$	50	$^\circ C/W$

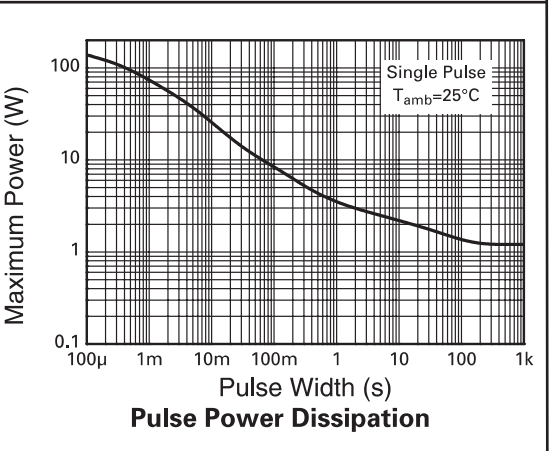
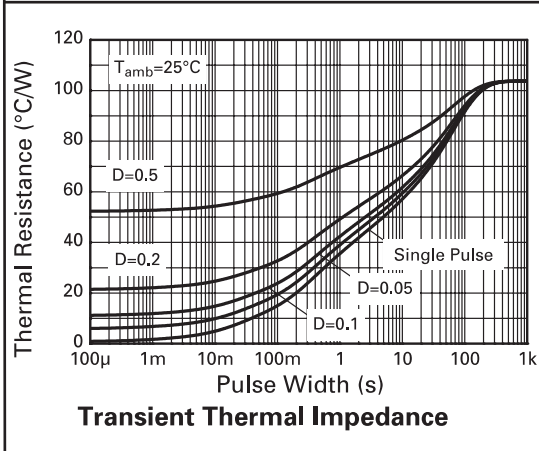
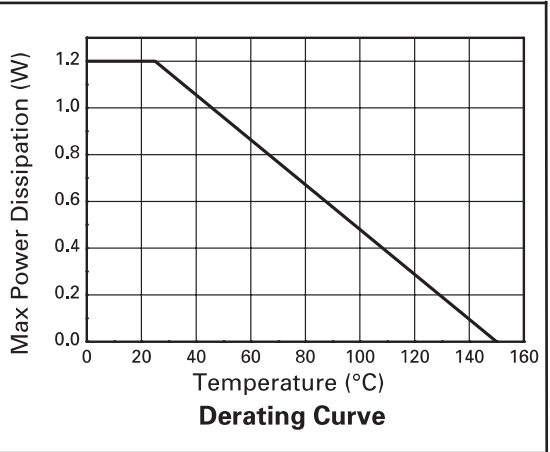
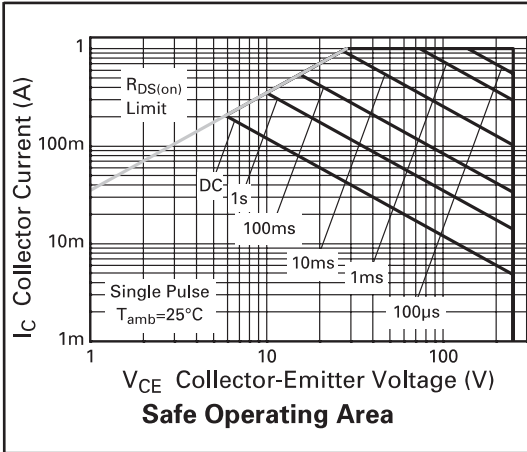
### NOTES

- (a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions
- (b) For a device surface mounted on FR4 PCB measured at  $t \leq 5$  secs.
- (c) Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

### NB High Voltage Applications

For high voltage applications, the appropriate industry sector guidelines should be considered with regard to voltage spacing between conductors.

## CHARACTERISTICS



# ZVP4525Z

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

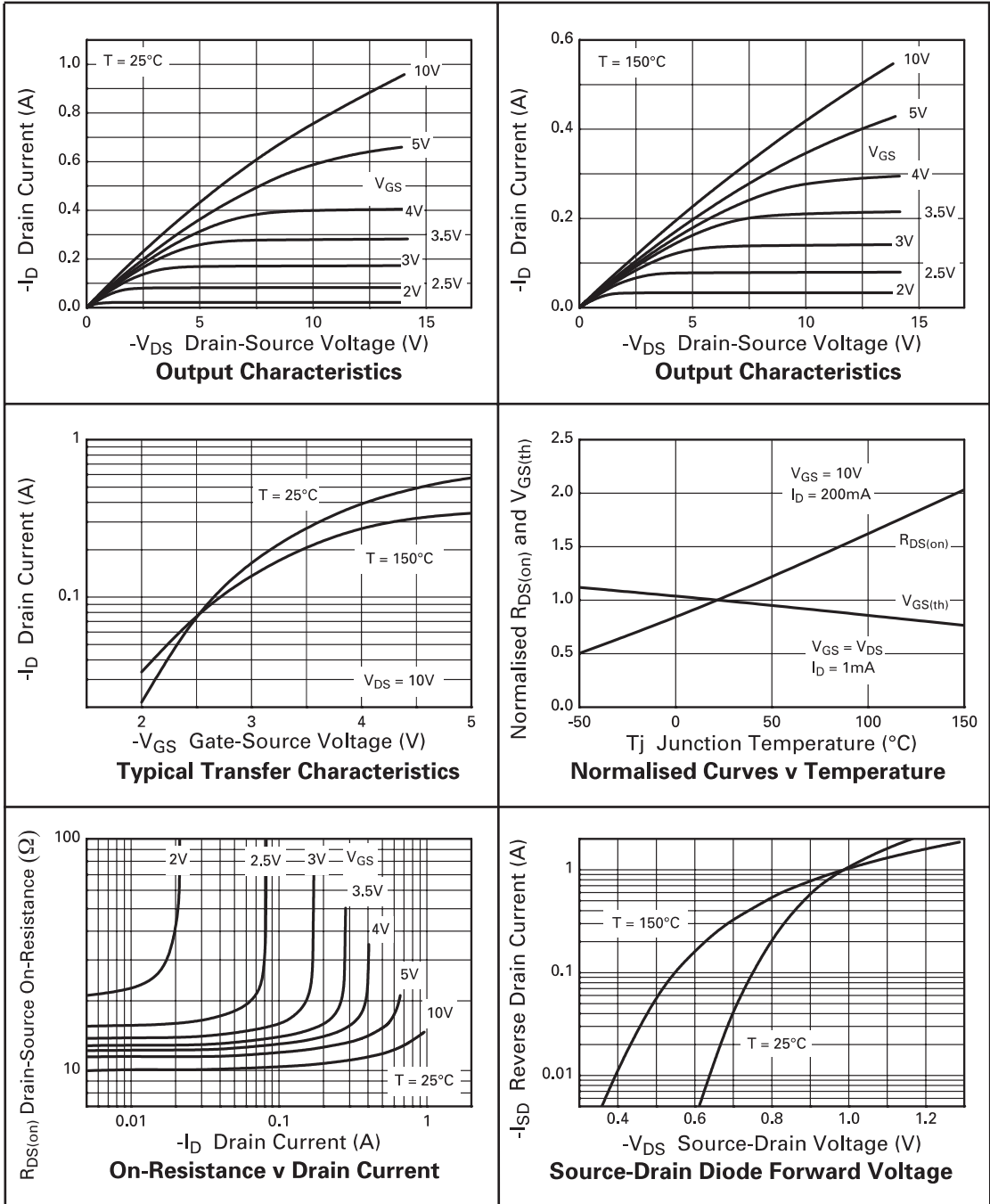
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
<b>STATIC</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	-250	-285		V	$I_D = -1\text{mA}, V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$		-30	-500	nA	$V_{DS} = -250\text{V}, V_{GS} = 0\text{V}$
Gate-Body Leakage	$I_{GSS}$		$\pm 1$	$\pm 100$	nA	$V_{GS} = \pm 40\text{V}, V_{DS} = 0\text{V}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	-0.8	-1.5	-2.0	V	$I_D = -1\text{mA}, V_{DS} = V_{GS}$
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$		10 13	14 18	$\Omega$ $\Omega$	$V_{GS} = -10\text{V}, I_D = -200\text{mA}$ $V_{GS} = -3.5\text{V}, I_D = -100\text{mA}$
Forward Transconductance (3)	$g_{fs}$	80	200		mS	$V_{DS} = -10\text{V}, I_D = -0.15\text{A}$
<b>DYNAMIC (3)</b>						
Input Capacitance	$C_{iss}$		73		pF	$V_{DS} = -25\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$
Output Capacitance	$C_{oss}$		12.8		pF	
Reverse Transfer Capacitance	$C_{rss}$		3.91		pF	
<b>SWITCHING(2) (3)</b>						
Turn-On Delay Time	$t_{d(on)}$		1.53		ns	$V_{DD} = -30\text{V}, I_D = -200\text{mA}$ $R_G = 50\Omega, V_{GS} = -10\text{V}$ (refer to test circuit)
Rise Time	$t_r$		3.78		ns	
Turn-Off Delay Time	$t_{d(off)}$		17.5		ns	
Fall Time	$t_f$		7.85		ns	
Total Gate Charge	$Q_g$		2.45	3.45	nC	$V_{DS} = -25\text{V}, V_{GS} = -10\text{V},$ $I_D = -200\text{mA}$ (refer to test circuit)
Gate-Source Charge	$Q_{gs}$		0.22	0.31	nC	
Gate Drain Charge	$Q_{gd}$		0.45	0.63	nC	
<b>SOURCE-DRAIN DIODE</b>						
Diode Forward Voltage (1)	$V_{SD}$			0.97	V	$T_j = 25^{\circ}\text{C}, I_S = -200\text{mA},$ $V_{GS} = 0\text{V}$
Reverse Recovery Time (3)	$t_{rr}$		205	290	ns	$T_j = 25^{\circ}\text{C}, I_F = -200\text{mA},$ $di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge (3)	$Q_{rr}$		21	29	nC	

(1) Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

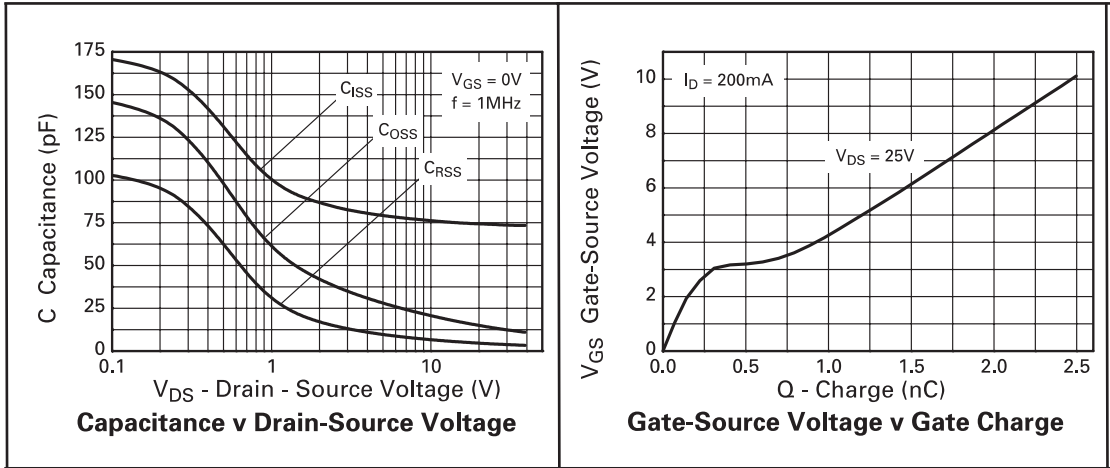
(2) Switching characteristics are independent of operating junction temperature.

(3) For design aid only, not subject to production testing.

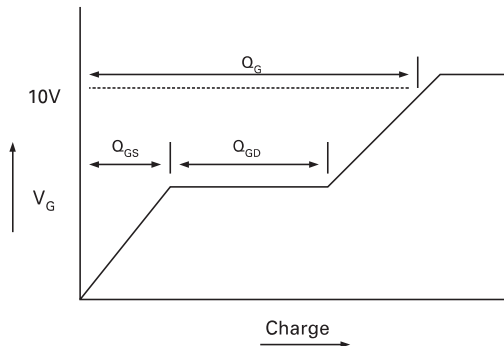
## TYPICAL CHARACTERISTICS



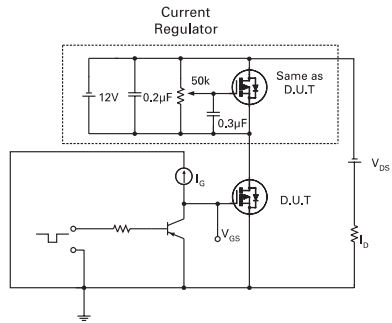
## CHARACTERISTICS



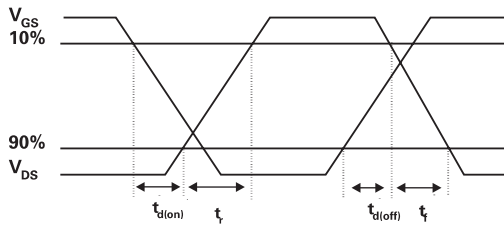
## TEST CIRCUITS



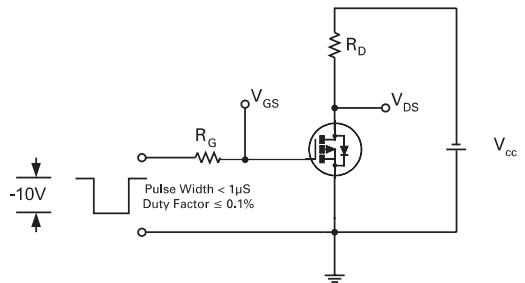
**Basic Gate Charge Waveform**



**Gate Charge Test Circuit**



**Switching Time Waveforms**



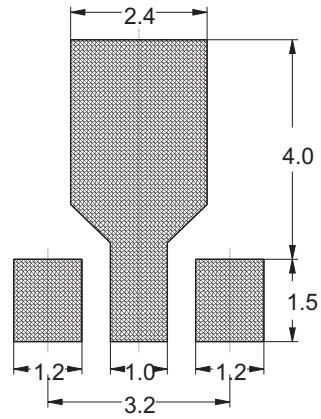
**Switching Time Test Circuit**

# ZVP4525Z

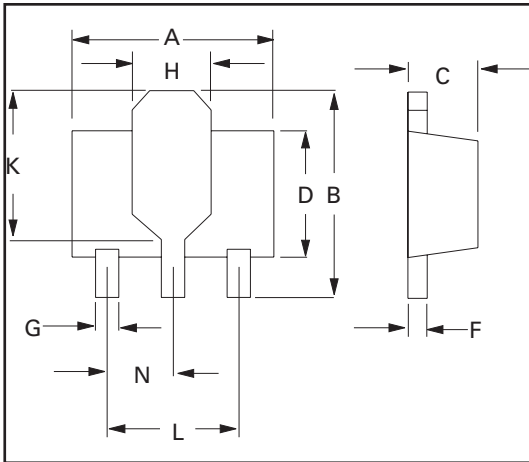
## PACKAGE DIMENSIONS

DIM	Millimetres		Inches	
	Min	Max	Min	Max
A	4.40	4.60	0.173	0.181
B	3.75	4.25	0.150	0.167
C	1.40	1.60	0.550	0.630
D	-	2.60	-	0.102
F	0.28	0.45	0.011	0.018
G	0.38	0.55	0.015	0.022
H	1.50	1.80	0.060	0.072
K	2.60	2.85	0.102	0.112
L	2.90	3.10	0.114	0.122
N	1.40	1.60	0.055	0.063

## PAD LAYOUT DETAILS



SOT89 pattern.  
Minimum Pad Size (dimensions in mm)



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