

## 250V N-CHANNEL ENHANCEMENT MODE MOSFET

### SUMMARY

**$V_{(BR)DSS}=250V$ ;  $R_{DS(ON)}=8.5\Omega$ ;  $I_D=230mA$**

### DESCRIPTION

This 250V enhancement mode N-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 circuits.

SOT89 and SOT223 versions are also available.

### FEATURES

- High voltage
- Low on-resistance
- Fast switching speed
- Low gate drive
- Low threshold
- Complementary P-channel Type ZVP4525E6
- SOT23-6 package

### APPLICATIONS

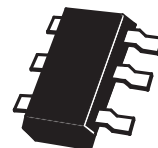
- Earth Recall and dialling switches
- Electronic hook switches
- High Voltage Power MOSFET Drivers
- Telecom call routers
- Solid state relays

### ORDERING INFORMATION

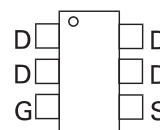
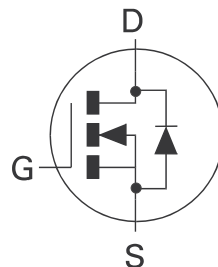
DEVICE	REEL SIZE (inches)	TAPE WIDTH (mm)	QUANTITY PER REEL
ZVN4525E6TA	7	8mm embossed	3000 units
ZVN4525E6TC	13	8mm embossed	10000 units

### DEVICE MARKING

- N52



**SOT23-6**



Top View

# ZVN4525E6

## 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)	$I_D$ $I_D$	230 183	mA mA
Pulsed Drain Current (c)	$I_{DM}$	1.44	A
Continuous Source Current (Body Diode)	$I_S$	1.1	A
Pulsed Source Current (Body Diode)	$I_{SM}$	1.44	A
Power Dissipation at $T_A=25^\circ C$ (a) Linear Derating Factor	$P_D$	1.1 8.8	W 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)	$R_{\theta JA}$	113	$^\circ C/W$
Junction to Ambient (b)	$R_{\theta JA}$	65	$^\circ C/W$

### 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

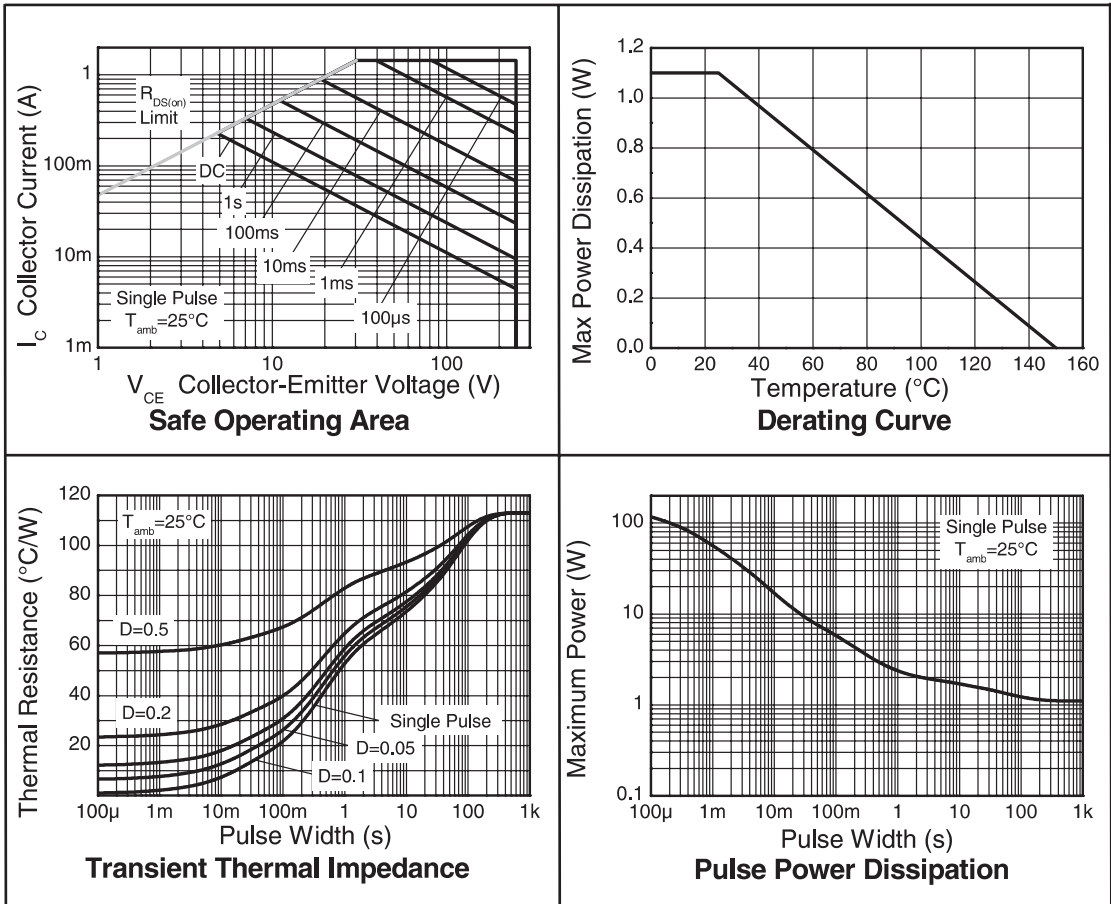
(b) For a device surface mounted on FR4 PCB measured at  $t \leq 5$  secs.

(c) Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal

### NB High Voltage Applications

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

## CHARACTERISTICS



# ZVN4525E6

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

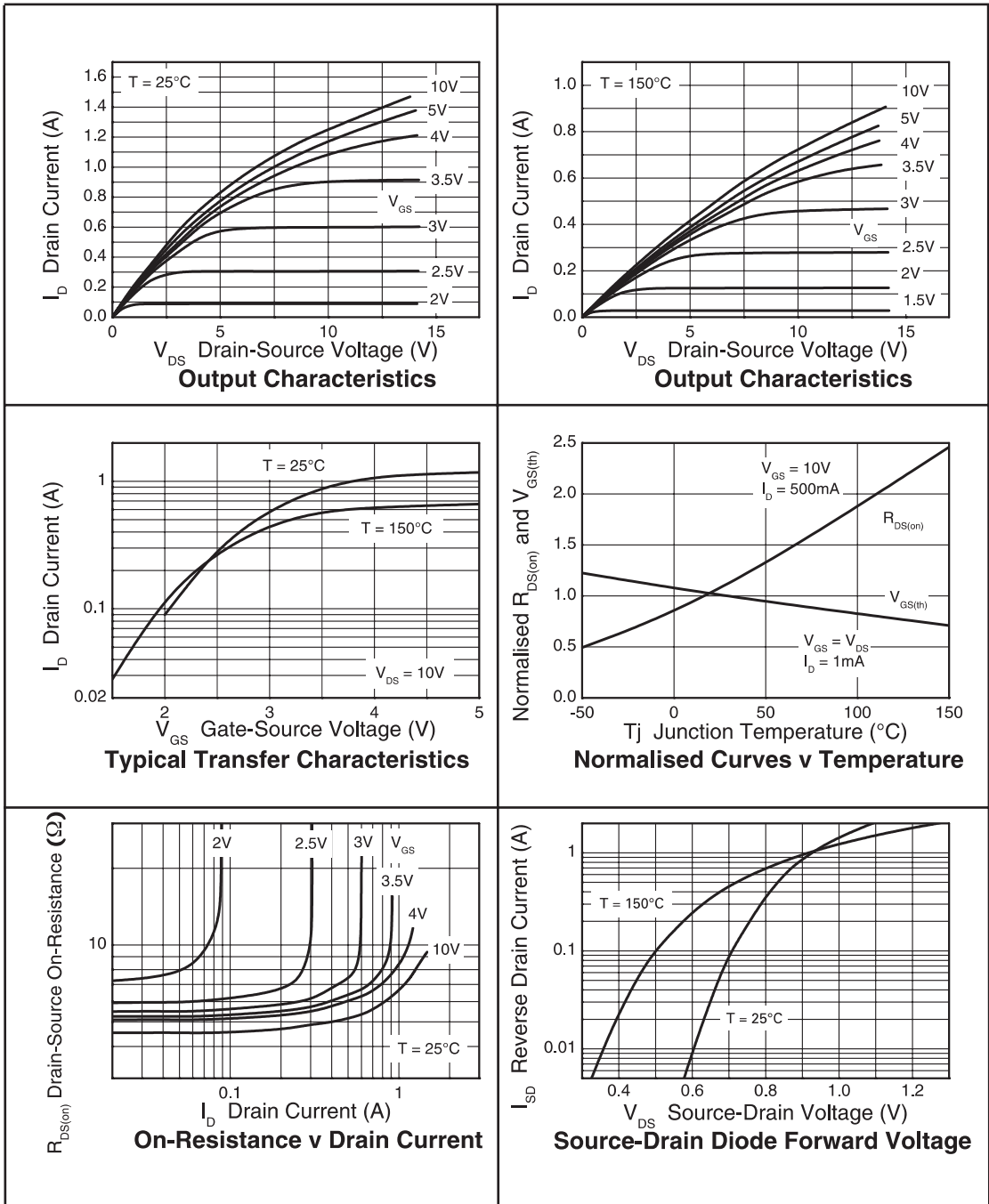
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNI T	CONDITIONS.
<b>STATIC</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	250	285		V	$I_D=1\text{mA}, V_{GS}=0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$		35	500	nA	$V_{DS}=250\text{V}, V_{GS}=0\text{V}$
Gate-Body Leakage	$I_{GSS}$		$\pm 1$	$\pm 100$	nA	$V_{GS}=\pm 40\text{V}, V_{DS}=0\text{V}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	0.8	1.4	1.8	V	$I_D=1\text{mA}, V_{DS}=V_{GS}$
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$		5.6 5.9 6.4	8.5 9.0 9.5	$\Omega$	$V_{GS}=10\text{V}, I_D=500\text{mA}$ $V_{GS}=4.5\text{V}, I_D=360\text{mA}$ $V_{GS}=2.4\text{V}, I_D=20\text{mA}$
Forward Transconductance (3)	$g_{fs}$	0.3	0.475		S	$V_{DS}=10\text{V}, I_D=0.3\text{A}$
<b>DYNAMIC (3)</b>						
Input Capacitance	$C_{iss}$		72		pF	$V_{DS}=25\text{V}, V_{GS}=0\text{V},$ $f=1\text{MHz}$
Output Capacitance	$C_{oss}$		11		pF	
Reverse Transfer Capacitance	$C_{rss}$		3.6		pF	
<b>SWITCHING(2) (3)</b>						
Turn-On Delay Time	$t_{d(on)}$		1.25		ns	$V_{DD}=30\text{V}, I_D=360\text{mA}$ $R_G=50\Omega, V_{GS}=10\text{V}$ (refer to test circuit)
Rise Time	$t_r$		1.70		ns	
Turn-Off Delay Time	$t_{d(off)}$		11.40		ns	
Fall Time	$t_f$		3.5		ns	
Total Gate Charge	$Q_g$		2.6	3.65	nC	$V_{DS}=25\text{V}, V_{GS}=10\text{V},$ $I_D=360\text{mA}$ (refer to test circuit)
Gate-Source Charge	$Q_{gs}$		0.2	0.28	nC	
Gate Drain Charge	$Q_{gd}$		0.5	0.70	nC	
<b>SOURCE-DRAIN DIODE</b>						
Diode Forward Voltage (1)	$V_{SD}$			0.97	V	$T_j=25^{\circ}\text{C}, I_S=360\text{mA},$ $V_{GS}=0\text{V}$
Reverse Recovery Time (3)	$t_{rr}$		186	260	ns	$T_j=25^{\circ}\text{C}, I_F=360\text{mA},$ $di/dt= 100\text{A}/\mu\text{s}$
Reverse Recovery Charge (3)	$Q_{rr}$		34	48	nC	

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

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

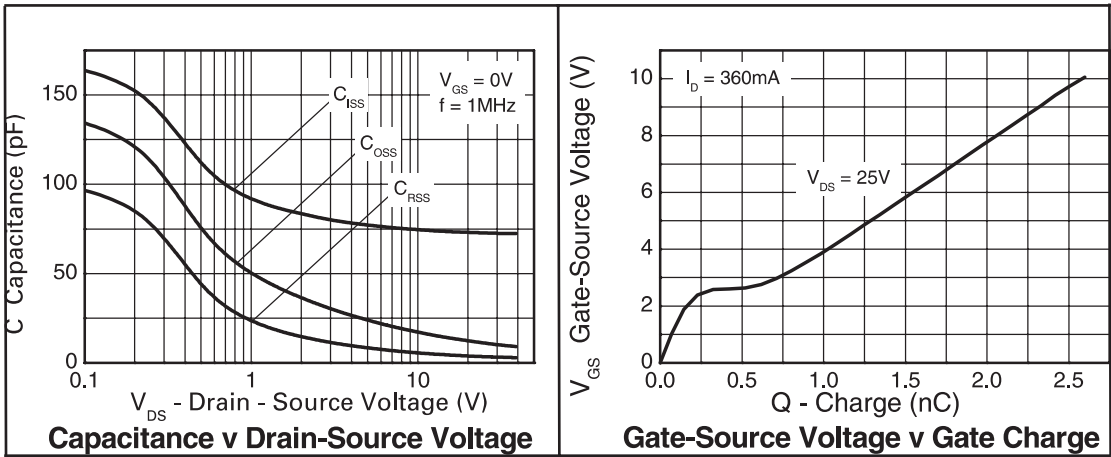
(3) For design aid only, not subject to production testing.

## TYPICAL CHARACTERISTICS

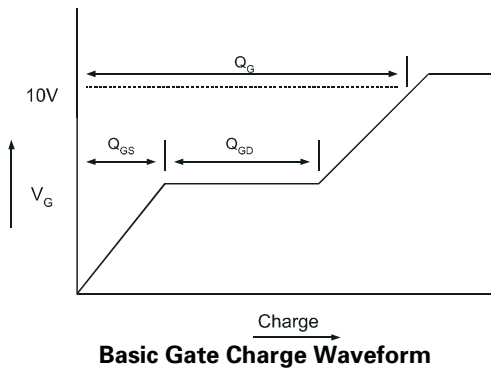


# ZVN4525E6

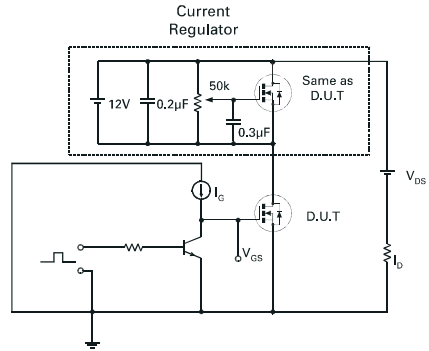
## CHARACTERISTICS



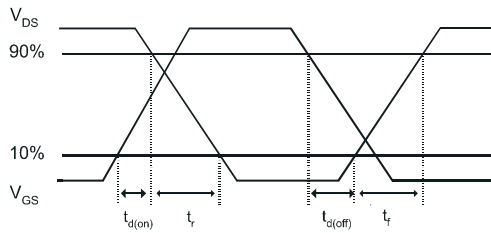
## CHARACTERISTICS



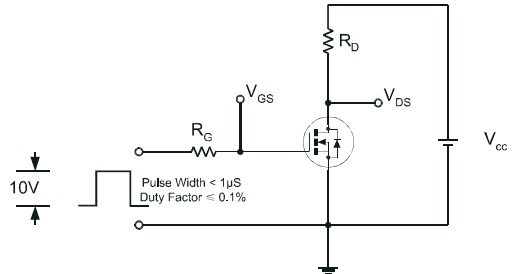
**Basic Gate Charge Waveform**



**Gate Charge Test Circuit**



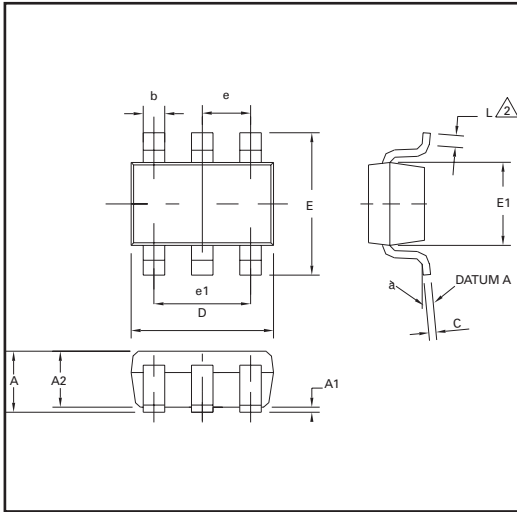
**Switching Time Waveforms**



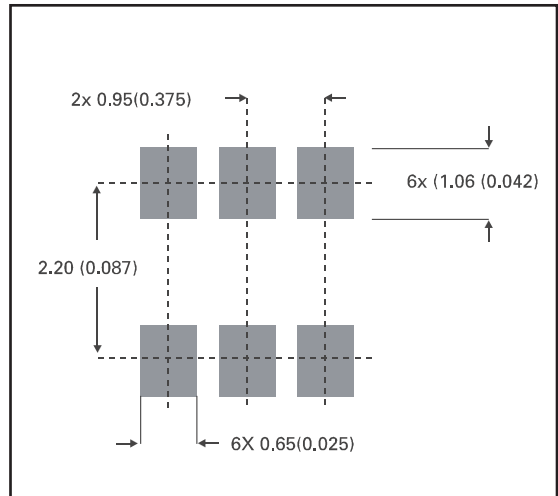
**Switching Time Test Circuit**

# ZVN4525E6

## PACKAGE DIMENSIONS



## PAD LAYOUT DETAILS



DIM	Millimetres		Inches	
	Min	Max	Min	Max
A	0.90	1.45	0.35	0.057
A1	0.00	0.15	0	0.006
A2	0.90	1.30	0.035	0.051
b	0.35	0.50	0.014	0.019
C	0.09	0.20	0.0035	0.008
D	2.80	3.00	0.110	0.118
E	2.60	3.00	0.102	0.118
E1	1.50	1.75	0.059	0.069
L	0.10	0.60	0.004	0.002
e	0.95 REF		0.037 REF	
e1	1.90 REF		0.074 REF	
L	0°	10°	0°	10°



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