

General Description

The TF2509 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

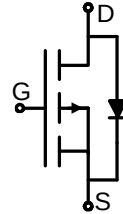
Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

Application

- Load Switches
- Power management
- Battery protection
- BLDC Motor driver

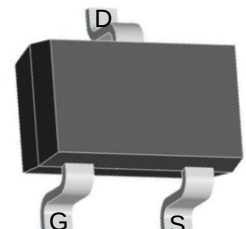
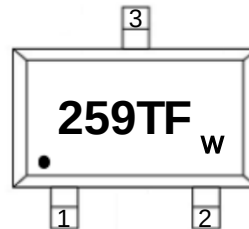
Product Summary



$$V_{DS} = -25V \quad I_D = -9.0A$$

$$R_{DS(ON)}(-10V \text{ typ}) = 15.0m\Omega$$

$$R_{DS(ON)}(-4.5V \text{ typ}) = 21.0m\Omega$$



SOT23-3L

Ordering Information:

Part NO.	TF2509
Marking1	259:TF2509; TF:tuofeng
Marking2	W:Week
Basic ordering unit (pcs)	3000

Absolute Maximum Ratings ($T_C = 25^\circ C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-25	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@T_C=25^\circ C}$	-9.0	A
	$I_{D@T_C=75^\circ C}$	-6.3	A
	$I_{D@T_C=100^\circ C}$	-5.4	A
Pulsed Drain Current ^①	I_{DM}	-25	A
Total Power Dissipation ^②	$P_D@T_C=25^\circ C$	1.25	W
Total Power Dissipation	$P_D@T_A=25^\circ C$	0.2	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case ^②	R_{thJC}	-	-	10	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	68	° C/W
Soldering temperature, wavesoldering for 8s	T_{sold}	-	-	265	° C

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-25			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu A$	-1.0	-1.3	-1.9	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -25V, V_{GS} = 0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -6.5A$		15.0	18.0	m Ω
		$V_{GS} = -4.5V, I_D = -5.0A$		21.0	24.0	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = -10V, I_D = -5.0A$		10		S
Source-drain voltage	V_{SD}	$I_S = -5.0A$		0.83	1.00	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{DS} = -15V, V_{GS} = 0V$ $f = 1MHz$	-	1285	-	pF
Output capacitance	C_{oss}		-	195.0	-	
Reverse transfer capacitance	C_{rss}		-	125.5	-	

●Gate Charge characteristics($T_a = 25^\circ C$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	$V_{DD} = -15V$ $I_D = -5.0A$ $V_{GS} = -10V$	-	30.5	-	nC
Gate - Source charge	Q_{gs}		-	4.31	-	
Gate - Drain charge	Q_{gd}		-	3.45	-	

Note:

① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Fig.1 Power Dissipation Derating Curve

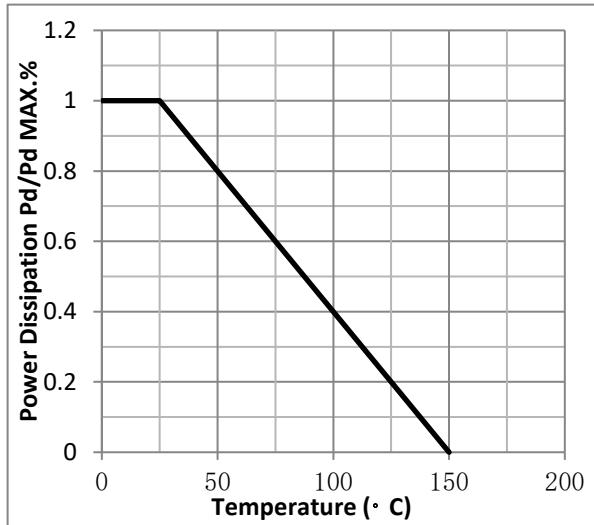


Fig.2 Typical output Characteristics

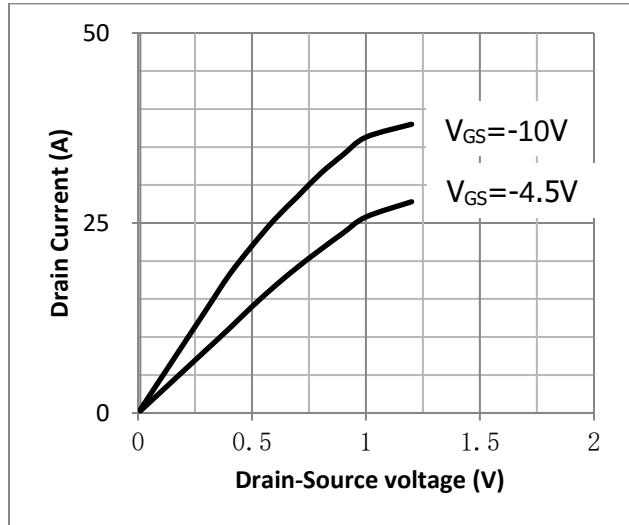


Fig.3 Threshold Voltage V.S Junction Temperature

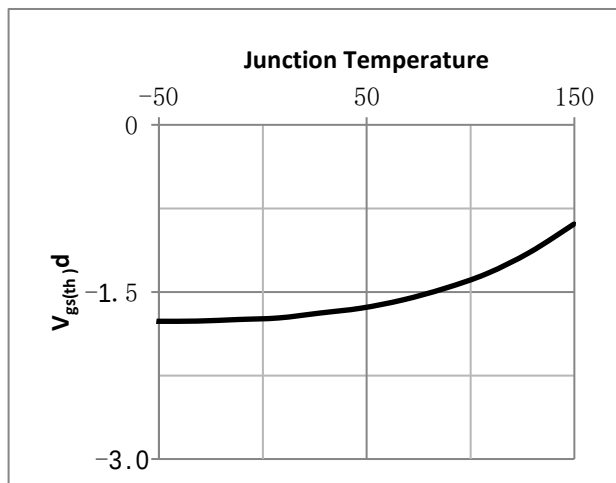


Fig.4 Resistance V.S Drain Current

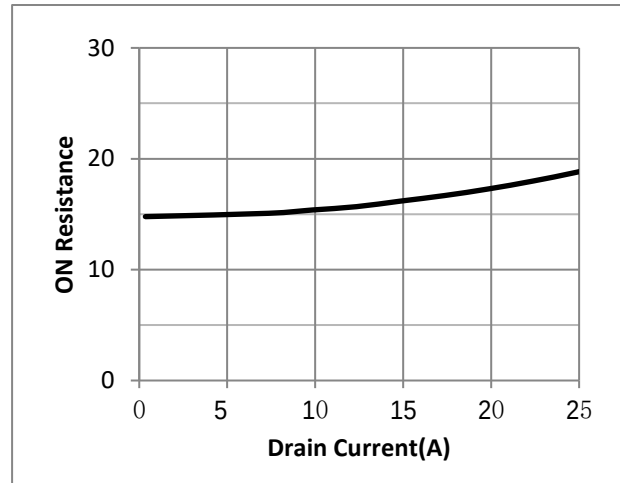


Fig.5 On-Resistance VS Gate Source Voltage

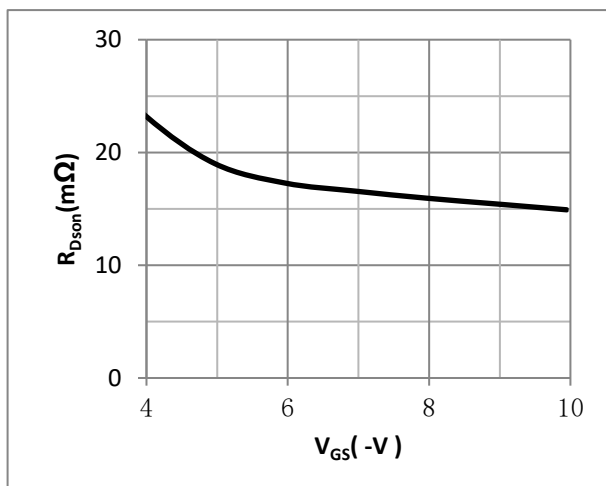


Fig.6 On-Resistance V.S Junction Temperature

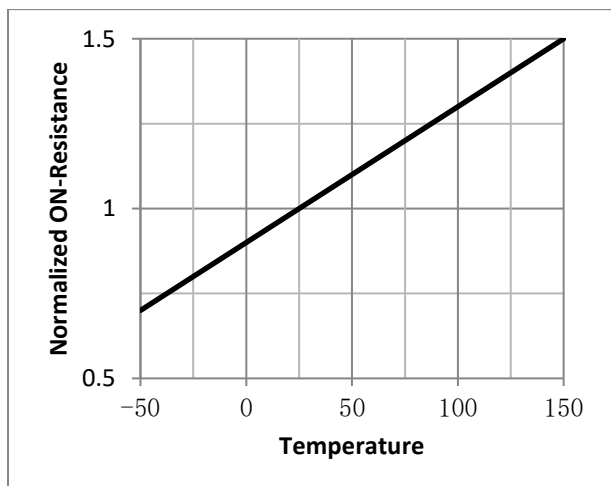


Fig.7 Switching Time Measurement Circuit

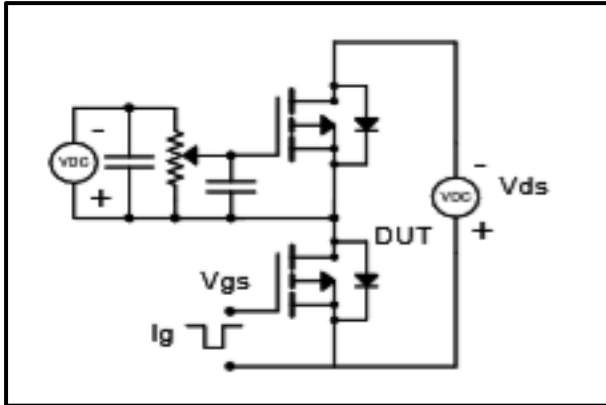


Fig.8 Gate Charge Waveform

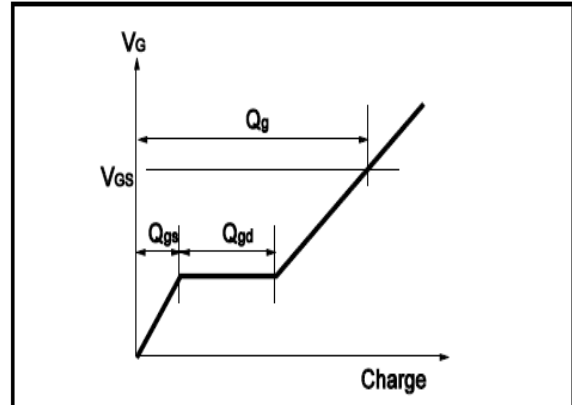


Fig.9 Switching Time Measurement Circuit

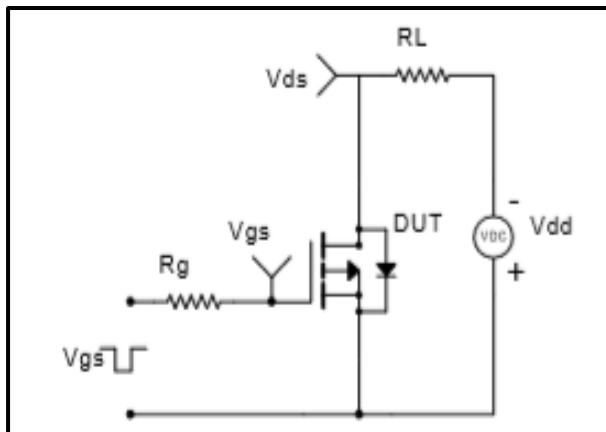


Fig.10 Gate Charge Waveform

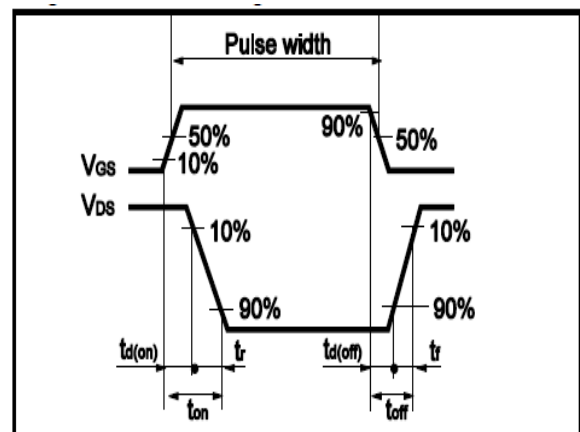


Fig.11 Avalanche Measurement Circuit

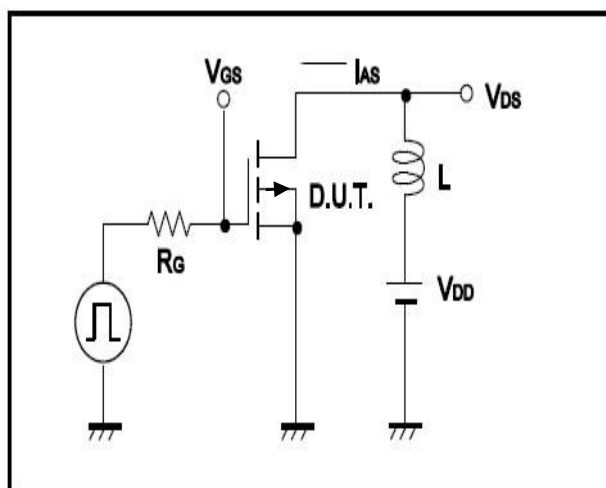
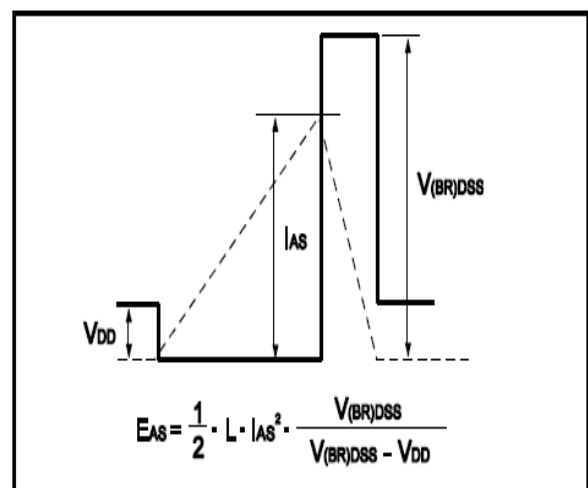
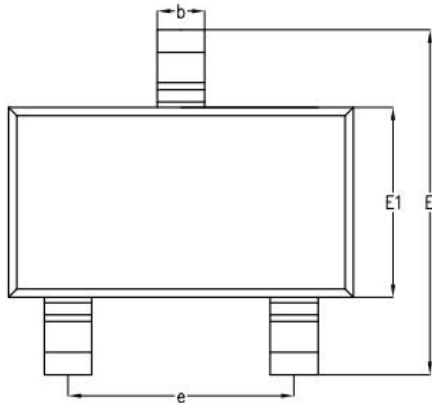
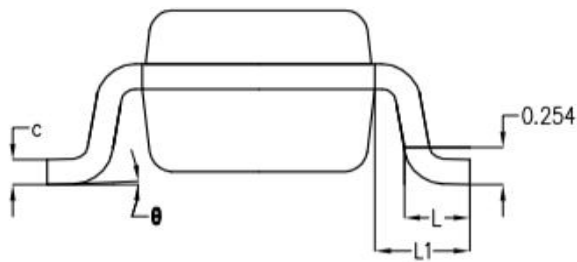
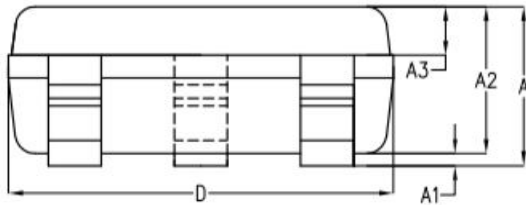


Fig.12 Avalanche Waveform



SOT23-3L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	1.19	1.24
A1	—	0.05	0.09
A2	1.05	1.10	1.15
A3	0.31	0.36	0.41
b	0.35	0.40	0.45
c	0.12	0.17	0.22
D	2.85	2.90	2.95
E	2.80	2.90	3.00
E1	1.55	1.60	1.65
e	1.90BSC		
L	0.37	0.45	0.53
L1	0.65BSC		
θ	0°	2°	8°