

TF4953B Dual P-Channel 20-V(D-S) MOSFET

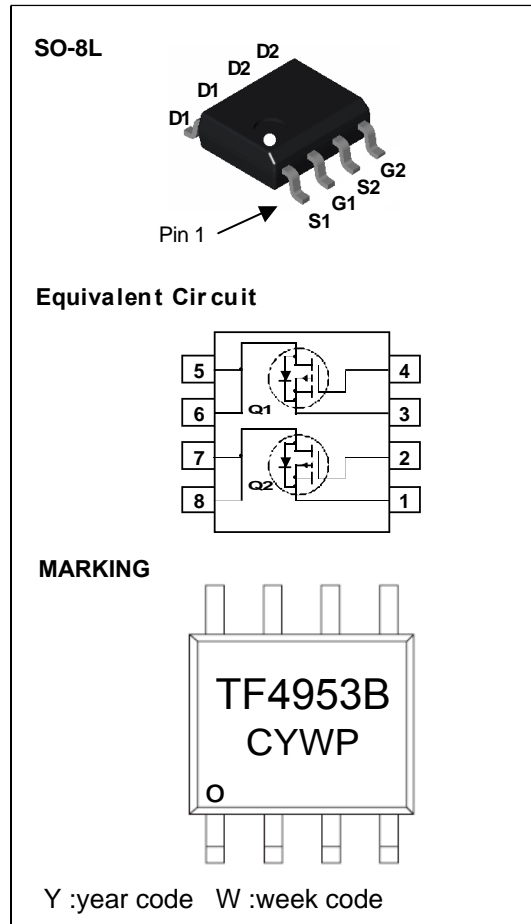
$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
-20V	0.058Ω@-4.5V	-5.0A
	0.085Ω@-2.5V	

General FEATURE

- TrenchFET Power MOSFET
- Lead free product is acquired
- Surface mount package

APPLICATION

- Load Switch for Portable Devices
- DC/DC Converter



Maximum ratings ($T_a=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	
Continuous Drain Current	I_D	-5.0	A
Pulsed Drain Current	I_{DM}	-10	
Continuous Source-Drain Diode Current	I_S	-1.30	
Maximum Power Dissipation	P_D	1.0	W
Thermal Resistance from Junction to Ambient($t \leq 5s$)	$R_{\theta JA}$	125	$^{\circ}C/W$
Junction Temperature	T_J	150	$^{\circ}C$
Storage Temperature	T_{stg}	-55 ~ +150	

Electrical Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-20			V
I_{BSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
I_{GSSF}	Gate–Body Leakage, Forward	$V_{GS} = -10\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$			100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-0.5	-0.7	-1.0	V
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$		85	110	m Ω
		$V_{GS} = -4.5\text{ V}, I_D = -3.5\text{ A}$		58	75	
$I_{D(on)}$	On–State Drain Current	$V_{GS} = -4.5\text{ V}, V_{DS} = -4.5\text{ V}$	-10			A
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{ V}, I_D = -2\text{ A}$		5		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$		405		pF
C_{oss}	Output Capacitance			75		pF
C_{rss}	Reverse Transfer Capacitance			55		pF
Switching Characteristics						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -10\text{ V}, I_D = -1\text{ A}, V_{GS} = -4.5\text{ V}, R_{GEN} = 10\ \Omega$		11		ns
t_r	Turn–On Rise Time			35		ns
$t_{d(off)}$	Turn–Off Delay Time			30		ns
t_f	Turn–Off Fall Time			10		ns
Q_g	Total Gate Charge	$V_{DS} = -10\text{ V}, I_D = -3\text{ A}, V_{GS} = -2.5\text{ V}$		3.3	12	nC
Q_{gs}	Gate–Source Charge			0.7		nC
Q_{gd}	Gate–Drain Charge			1.3		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				-1.3	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = -1.3\text{ A}$		-0.8	-1.2	V

Notes:

- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.

Typical Electrical and Thermal Characteristics

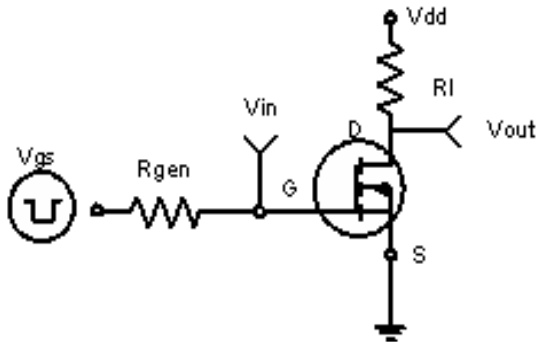


Figure 1: Switching Test Circuit

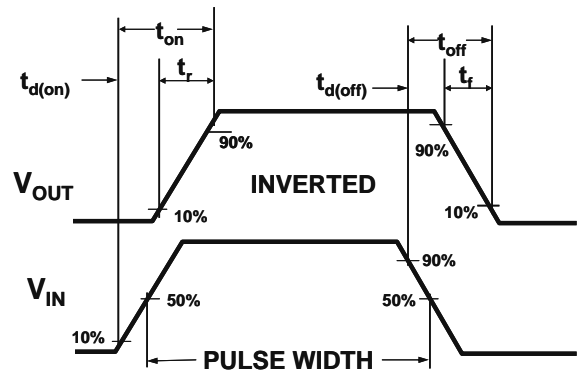


Figure 2: Switching Waveforms

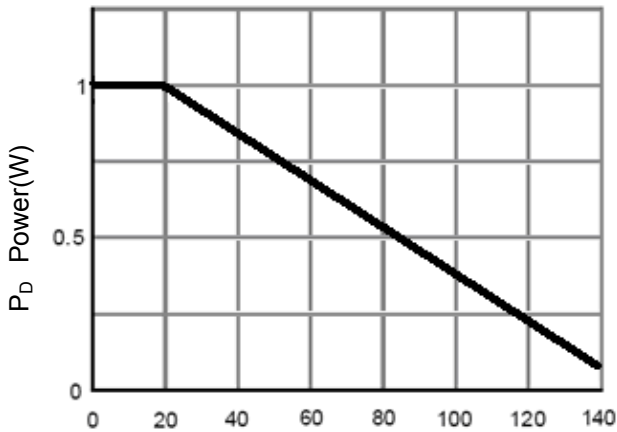


Figure 3 Power Dissipation

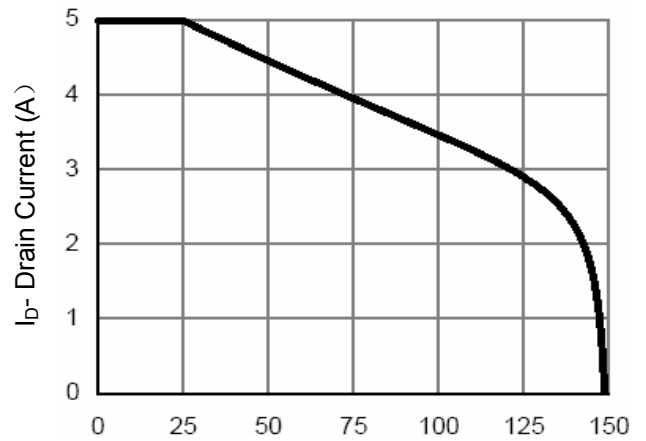


Figure 4 Drain Current

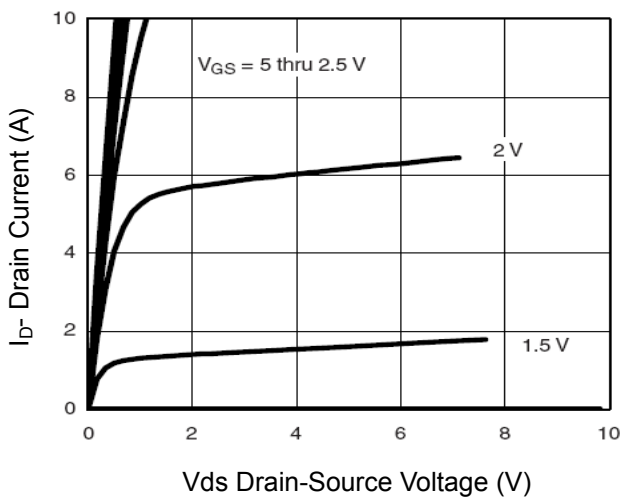


Figure 5 Output Characteristics

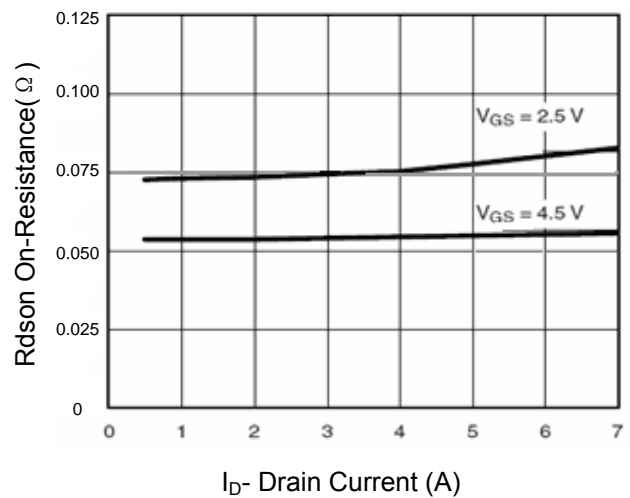
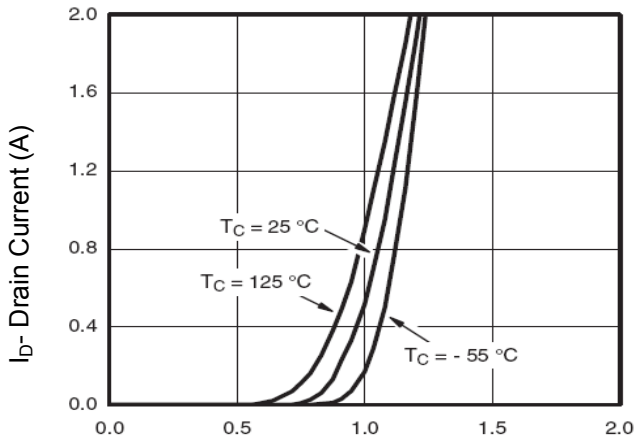
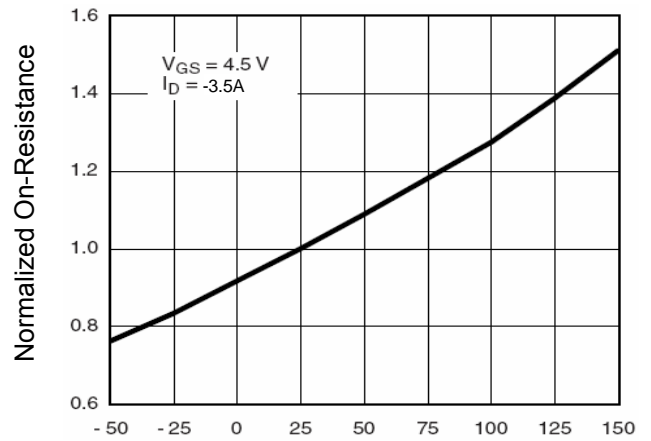


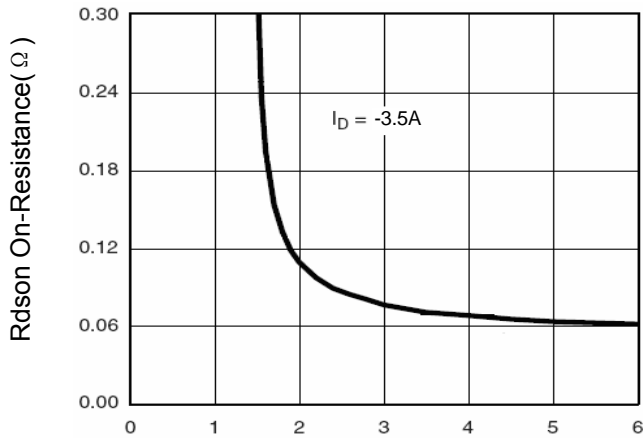
Figure 6 Drain-Source On-Resistance



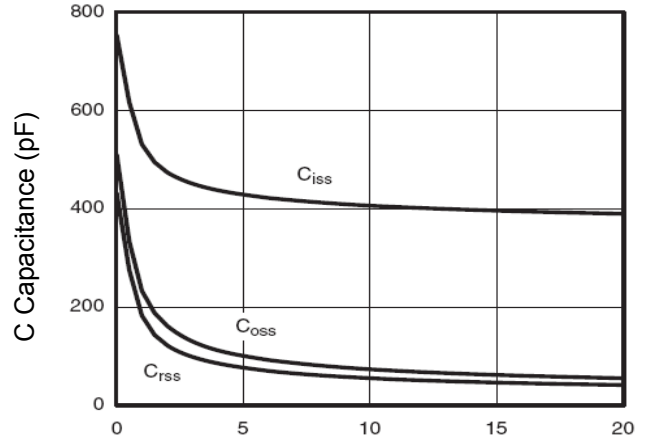
Vgs Gate-Source Voltage (V)
Figure 7 Transfer Characteristics



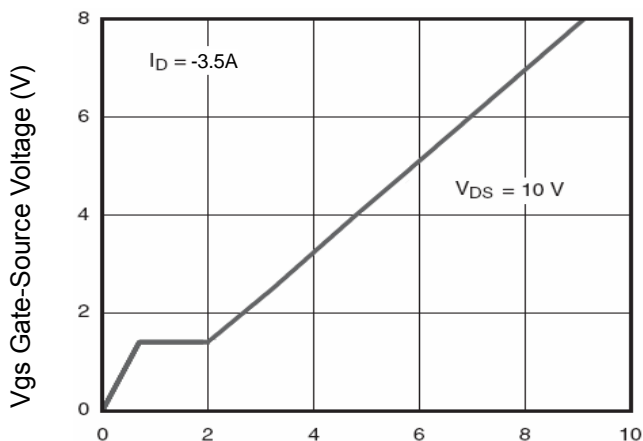
T_J -Junction Temperature($^\circ\text{C}$)
Figure 8 Drain-Source On-Resistance



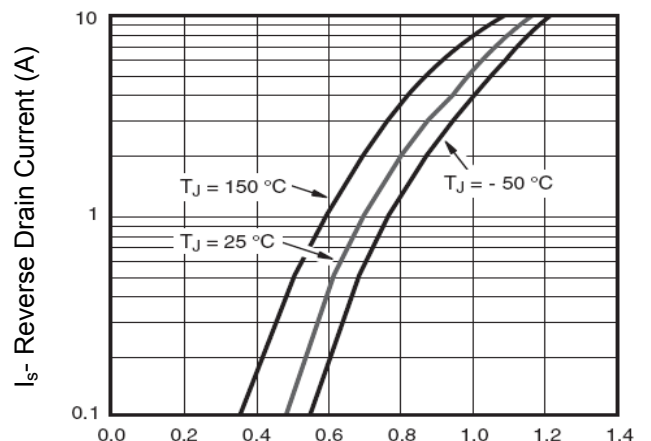
Vgs Gate-Source Voltage (V)
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)
Figure 12 Source- Drain Diode Forward

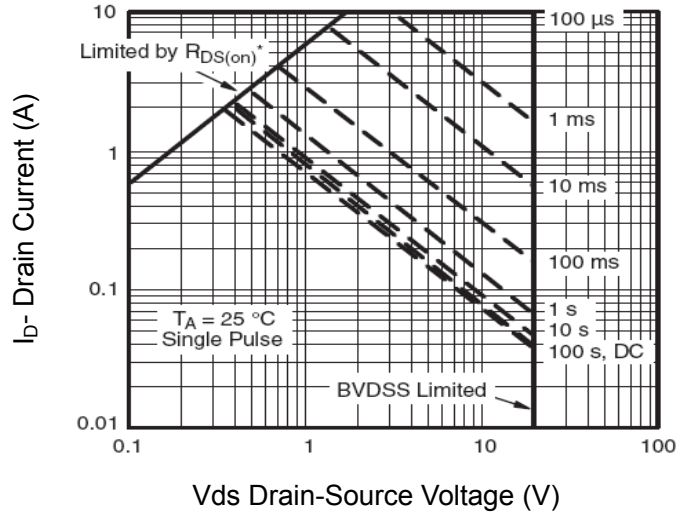


Figure 13 Safe Operation Area

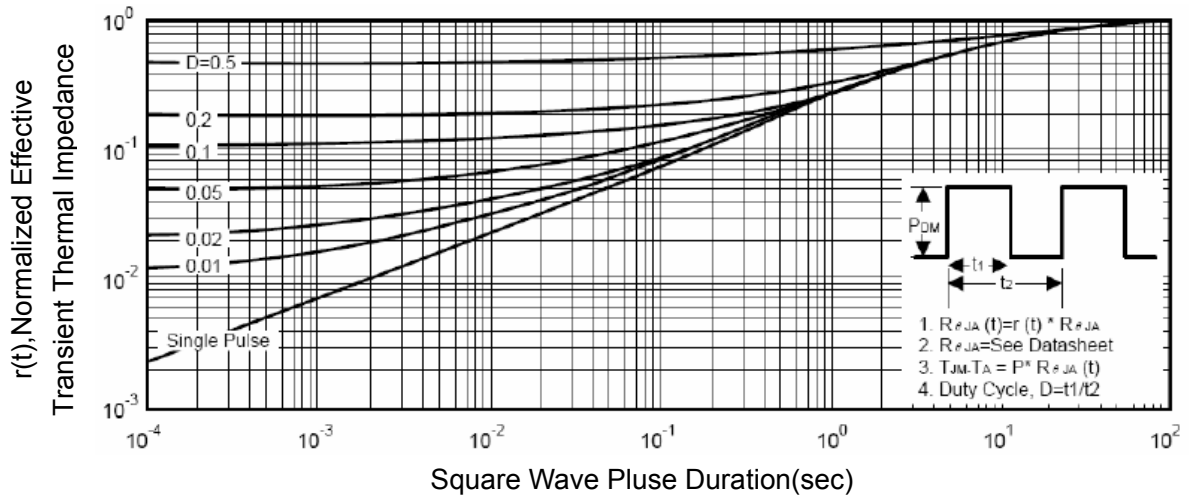
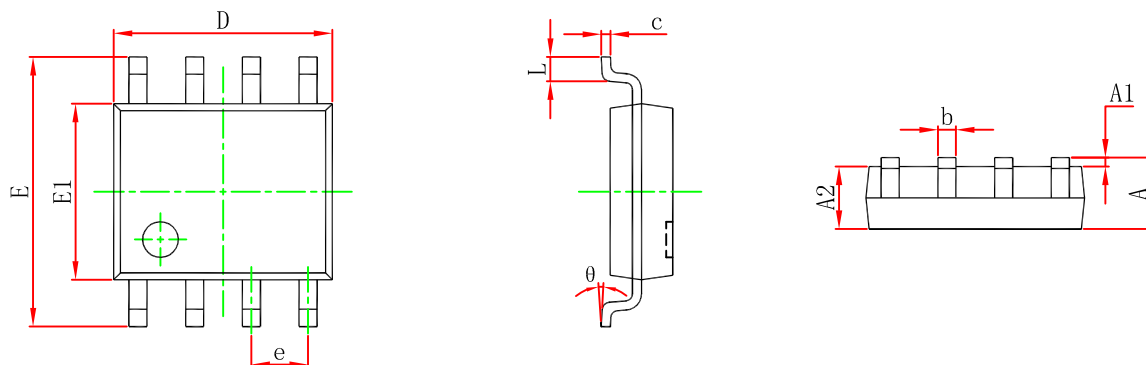


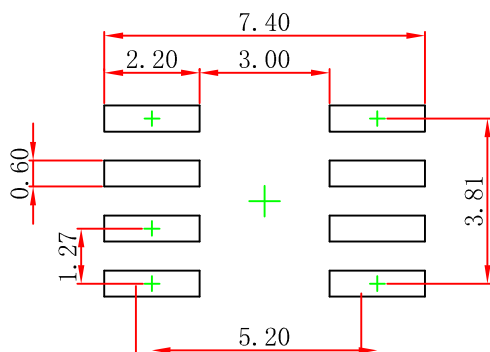
Figure 14 Normalized Maximum Transient Thermal Impedance

SOP8 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

SOP8 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.