



General Description

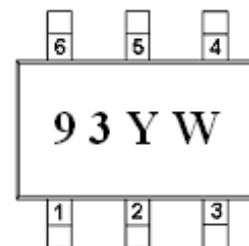
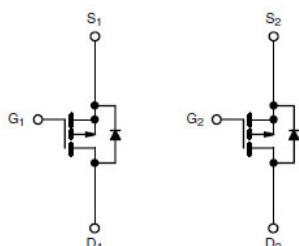
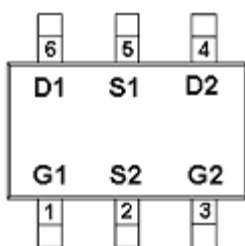
AFP3993, P-Channel enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent $R_{DS(ON)}$, low gate charge.

These devices are particularly suited for low voltage power management, and low in-line power loss are needed in commercial industrial surface mount applications.

Features

- -30V/-3.6A, $R_{DS(ON)}=150m\Omega@V_{GS}=-10.0V$
- -30V/-3.2A, $R_{DS(ON)}=235m\Omega@V_{GS}=-4.5V$
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability
- TSOP-6 package design

Pin Description (TSOP-6)



Application

- Battery Switch for Portable Devices
- Computers
 - Bus Switch
 - Load Switch
 - LED Display

PPin Define

Pin	Symbol	Description
1	G1	Gate 1
2	S2	Source 2
3	G2	Gate 2
4	D2	Drain 2
5	S1	Source 1
6	D1	Drain 1

Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFP3993TS6RG	93YW	TSOP-6	Tape & Reel	3000 EA

※ 93 parts code

※ Y year code (0 ~ 9)

※ W week code (A ~ Z = 1 ~ 26 / a ~ z = 27 ~ 52)

※ AFP3993TS6RG : 7" Tape & Reel ; Pb- Free ; Halogen- Free



Absolute Maximum Ratings

($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V_{DSS}	-30	V
Gate –Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current($T_J=150^{\circ}\text{C}$)	I_D	$T_A=25^{\circ}\text{C}$	-3.6
		$T_A=70^{\circ}\text{C}$	-3.0
Pulsed Drain Current	I_{DM}	-15	A
Continuous Source Current(Diode Conduction)	I_S	-1.5	A
Power Dissipation	P_D	$T_A=25^{\circ}\text{C}$	2.0
		$T_A=70^{\circ}\text{C}$	1.3
Operating Junction Temperature	T_J	150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55/150	$^{\circ}\text{C}$
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	120	$^{\circ}\text{C}/\text{W}$

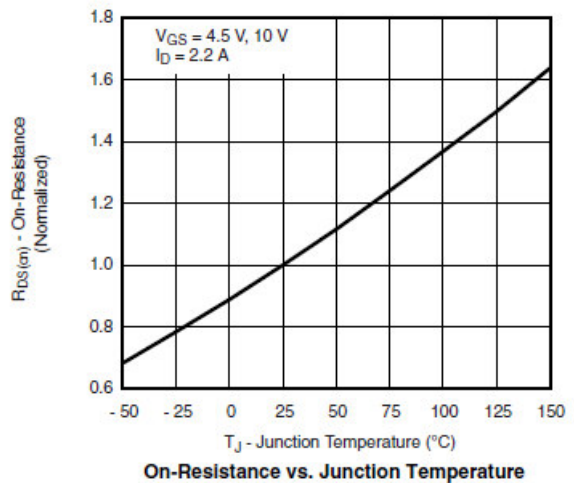
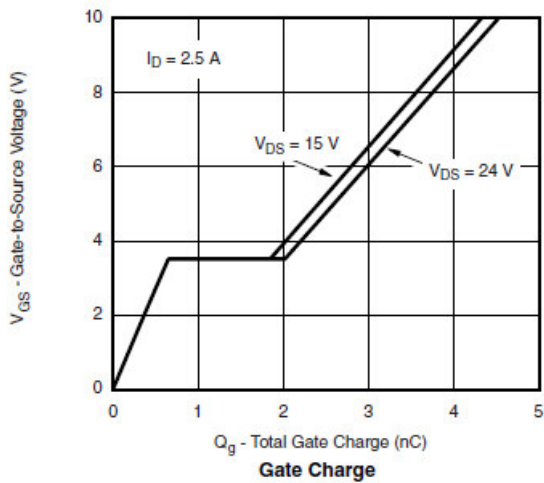
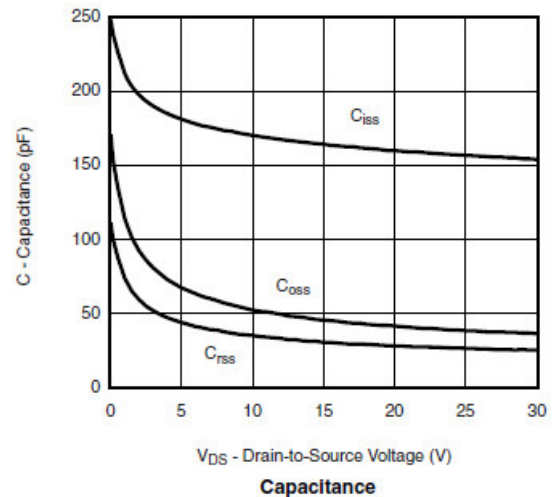
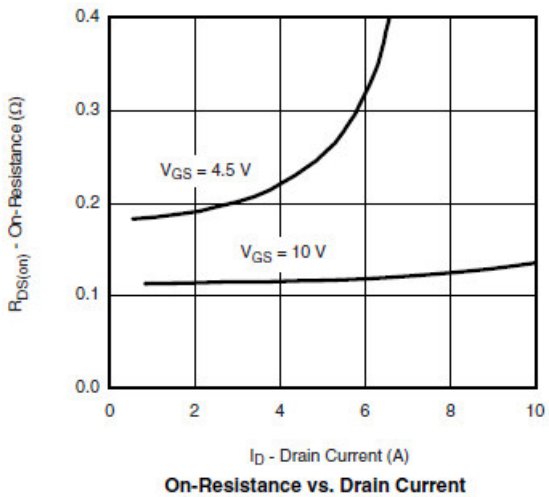
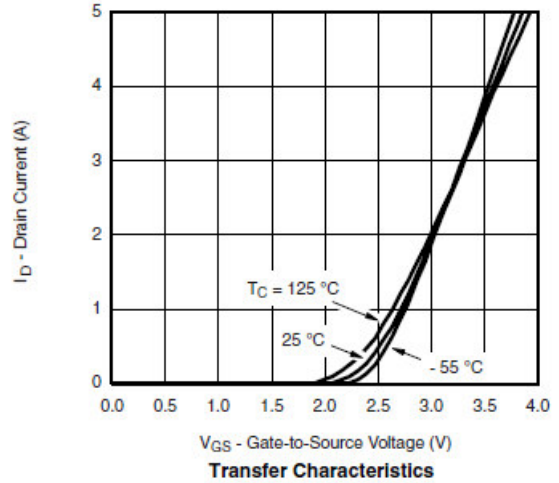
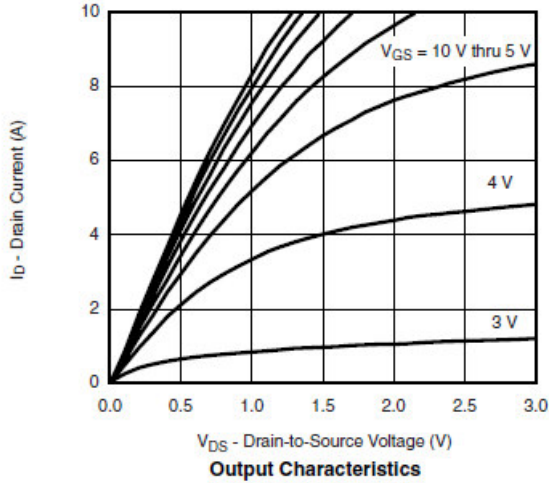
Electrical Characteristics

($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{V}, I_D=-250\mu\text{A}$	-30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1.0		-2.6	V
Gate Leakage Current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-24\text{V}, V_{GS}=0\text{V}$			-1	uA
		$V_{DS}=-24\text{V}, V_{GS}=0\text{V}$ $T_A=85^{\circ}\text{C}$			-30	
On-State Drain Current	$I_{D(on)}$	$V_{DS} \leq -5\text{V}, V_{GS}=-10\text{V}$	-10			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10.0\text{V}, I_D=-3.6\text{A}$		135	150	m Ω
		$V_{GS}=-4.5\text{V}, I_D=-3.2\text{A}$		220	235	
Forward Transconductance	g_{FS}	$V_{DS}=-5\text{V}, I_D=-4.0\text{A}$		10		S
Diode Forward Voltage	V_{SD}	$I_S=-1.7\text{A}, V_{GS}=0\text{V}$		-0.7	-1.3	V
Dynamic						
Total Gate Charge	Q_g	$V_{DS}=-15\text{V}, V_{GS}=-4.5\text{V}$ $I_D=-2.5\text{A}$		2.5		nC
Gate-Source Charge	Q_{gs}			0.8		
Gate-Drain Charge	Q_{gd}			1.0		
Input Capacitance	C_{iss}	$V_{DS}=-15\text{V}, V_{GS}=0\text{V}$ $f=1\text{MHz}$		170		pF
Output Capacitance	C_{oss}			50		
Reverse Transfer Capacitance	C_{rss}			30		
Turn-On Time	$t_{d(on)}$	$V_{DD}=-15\text{V}, R_L=7.5\Omega$ $I_D=-2.0\text{A}, V_{GEN}=-10\text{V}$ $R_G=1\Omega$		5	10	ns
	t_r			10	16	
Turn-Off Time	$t_{d(off)}$			10	16	
	t_f			5	10	

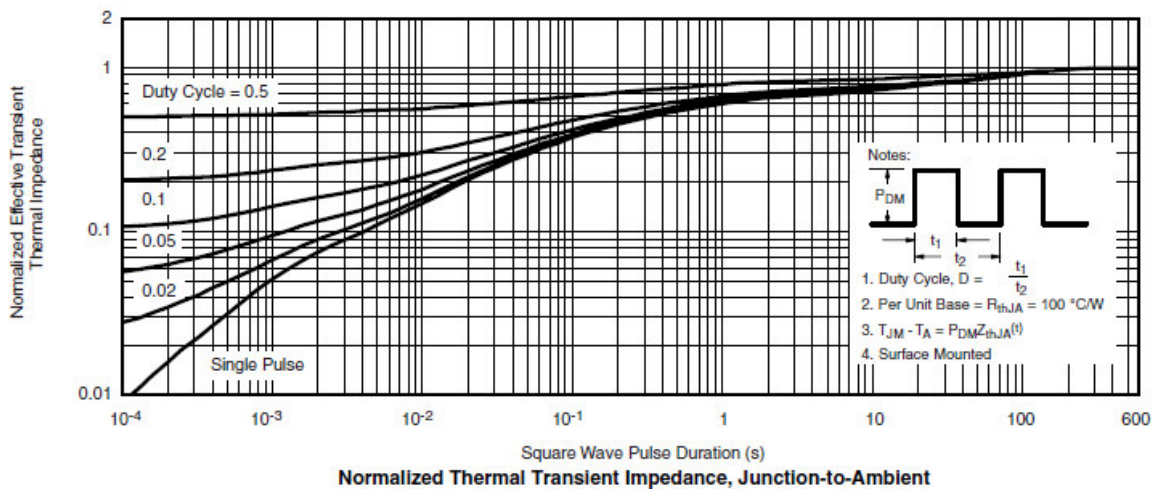
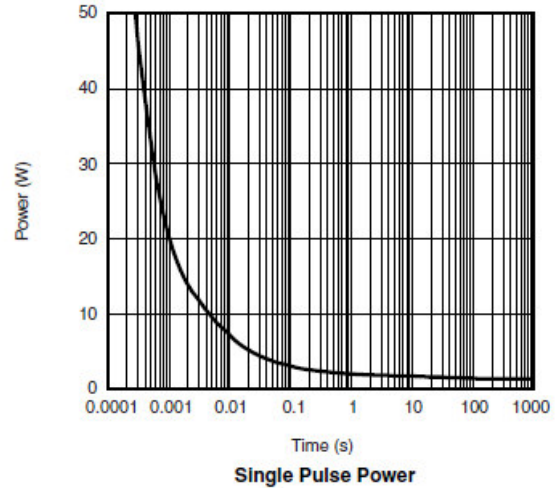
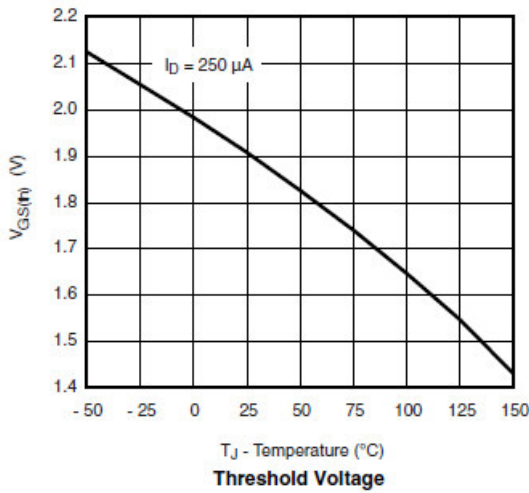
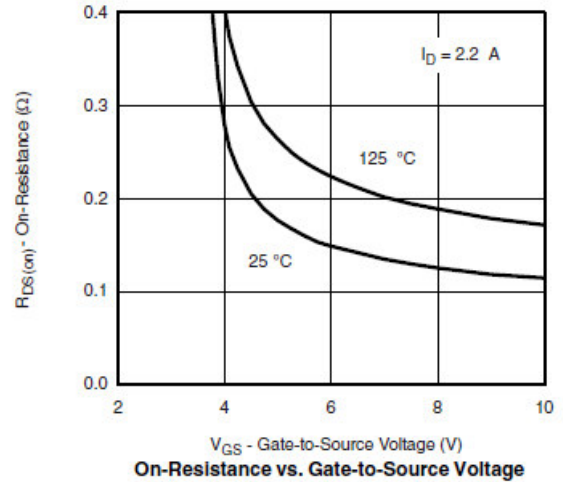
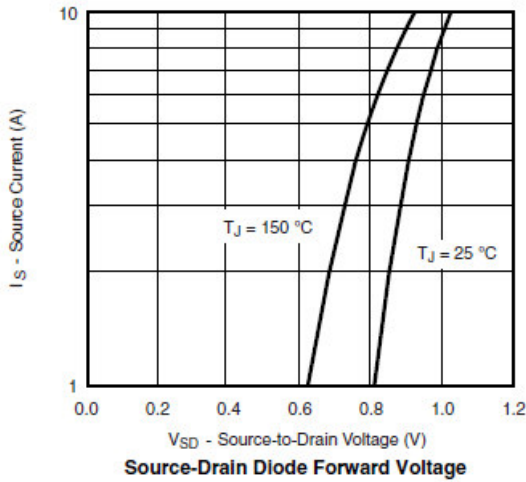


Typical Characteristics





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Typical Characteristics

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

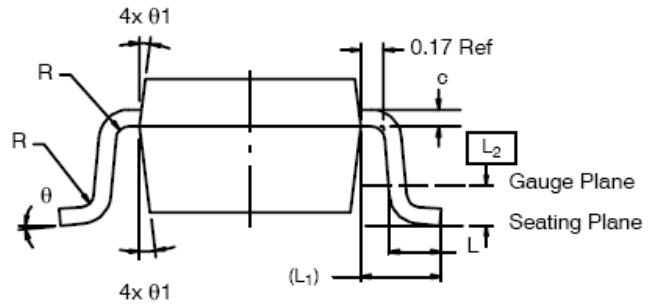
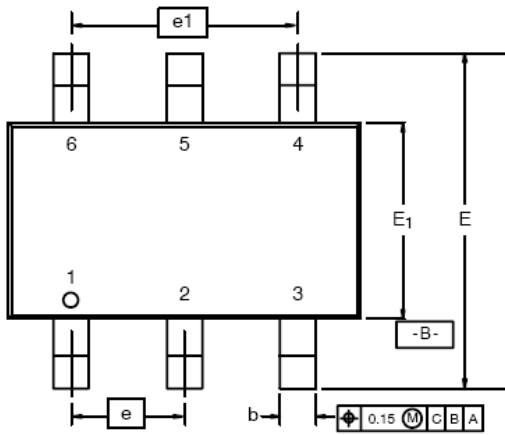


Unclamped Inductive Switching Test Circuit & Waveforms





Package Information (TSOP-6)



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A ₁	0.01	-	0.10	0.0004	-	0.004
A ₂	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.96	0.106	0.112	0.117
E ₁	1.55	1.65	1.70	0.061	0.065	0.067
e	1.00 BSC			0.0394 BSC		
e ₁	1.90	2.00	2.10	0.075	0.080	0.085
L	0.35	-	0.50	0.014	-	0.020
L ₁	0.60 Ref			0.024 Ref		
L ₂	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0°	4°	8°	0°	4°	8°
θ ₁	7° Nom			7° Nom		

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