

TF2369 P-Channel 30-V(D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (typ) (Ω)	I_D (A)
- 30	0.029@ $V_{GS} = -10$ V	- 5.4
	0.034 @ $V_{GS} = -6$ V	- 5.0
	0.040 @ $V_{GS} = -4.5$ V	- 4.6

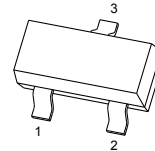
General FEATURE

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

APPLICATION

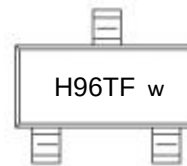
- Load Switch for Portable Devices
- DC/DC Converter

SOT-23



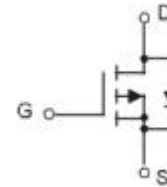
- 1.GATE
- 2.SOURCE
- 3.DRAIN

MARKING



*w: week code

Equivalent Circuit



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	$T_A = 25^\circ\text{C}$	I_D	- 5.4	A
Pulsed Drain Current ($t = 100 \mu\text{s}$)		I_{DM}	- 80	
Continous Source-Drain Diode Current	$T_C = 25^\circ\text{C}$	I_S	- 2.1	
	$T_A = 25^\circ\text{C}$		- 1 ^{b,c}	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	2.5	W
	$T_C = 70^\circ\text{C}$		1.6	
	$T_A = 25^\circ\text{C}$		1.25 ^{b,c}	
	$T_A = 70^\circ\text{C}$		0.8 ^{b,c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b,d}	$t \leq 5$ s	R_{thJA}	75	100	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	40	50	

Notes:

- Based on $T_C = 25^\circ\text{C}$.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under steady state conditions is 166 $^\circ\text{C/W}$.



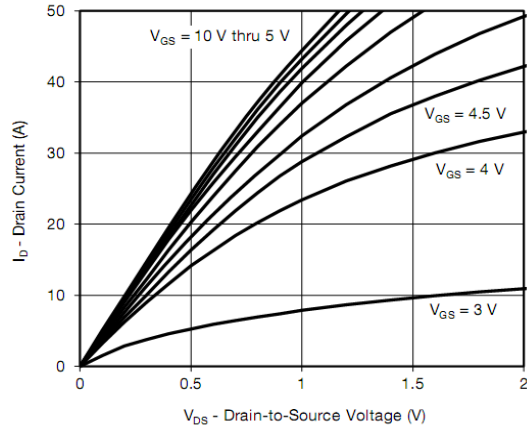
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 19		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			4		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.2	-1.3	- 2.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 30 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 30 V, V _{GS} = 0 V, T _J = 55 °C			- 5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 5 V, V _{GS} = - 10 V	- 25			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 5.4 A		0.029	0.032	Ω
		V _{GS} = - 6 V, I _D = - 5 A		0.034	0.038	
		V _{GS} = - 4.5 V, I _D = - 4.6 A		0.040	0.045	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 5.4 A		18		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 15 V, V _{GS} = 0 V, f = 1 MHz		1295		pF
Output Capacitance	C _{oss}			150		
Reverse Transfer Capacitance	C _{rss}			130		
Total Gate Charge	Q _g	V _{DS} = - 15 V, V _{GS} = - 10 V, I _D = - 5.4 A		24	36	nC
				11.4	17	
Gate-Source Charge	Q _{gs}	V _{DS} = - 15 V, V _{GS} = - 4.5 V, I _D = - 5.4 A		3.4		
Gate-Drain Charge	Q _{gd}			3.8		
Gate Resistance	R _g	f = 1 MHz	1.5	7.7	15.4	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 3.5 Ω I _D ≅ - 4.3 A, V _{GEN} = - 10 V, R _g = 1 Ω		13	20	ns
Rise Time	t _r			4	8	
Turn-Off Delay Time	t _{d(off)}			38	57	
Fall Time	t _f			6	12	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 3.5 Ω I _D ≅ - 4.3 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		28	42	
Rise Time	t _r			16	24	
Turn-Off Delay Time	t _{d(off)}			30	45	
Fall Time	t _f			10	20	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 2.1	A
Pulse Diode Forward Current (t = 100 μs)	I _{SM}				- 80	
Body Diode Voltage	V _{SD}	I _S = - 4.3 A, V _{GS} = 0 V		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 4.3 A, dI/dt = 100 A/μs, T _J = 25 °C		15	23	ns
Body Diode Reverse Recovery Charge	Q _{rr}			7	14	nC
Reverse Recovery Fall Time	t _a			8		ns
Reverse Recovery Rise Time	t _b			7		

Notes:

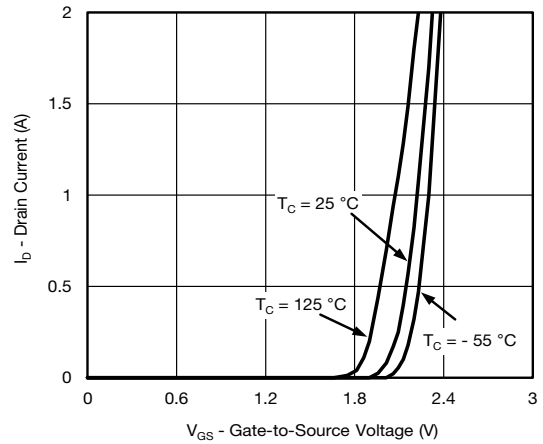
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

b. Guaranteed by design, not subject to production testing.

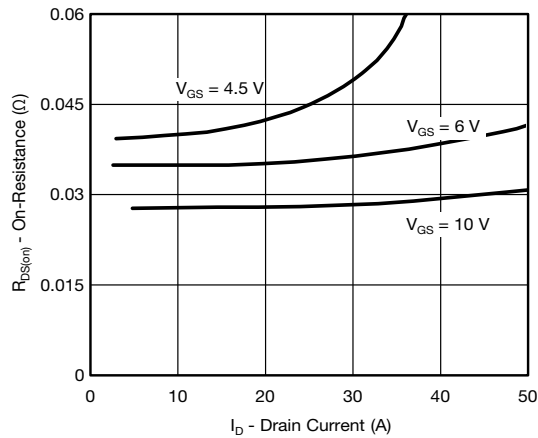
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



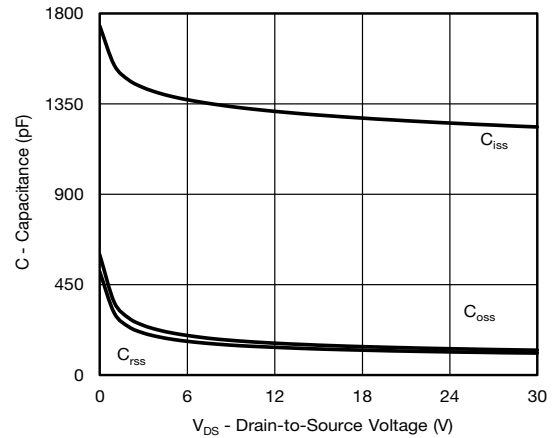
Output Characteristics



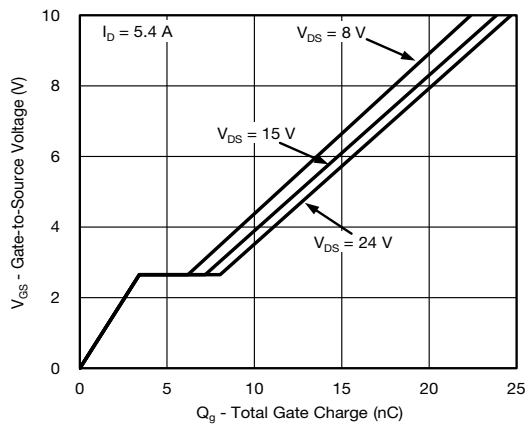
Transfer Characteristics



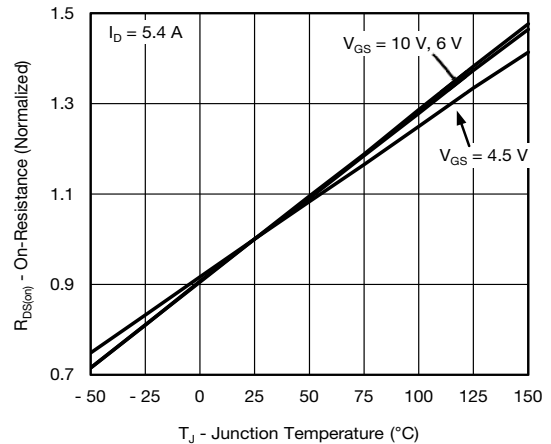
On-Resistance vs. Drain Current



Capacitance

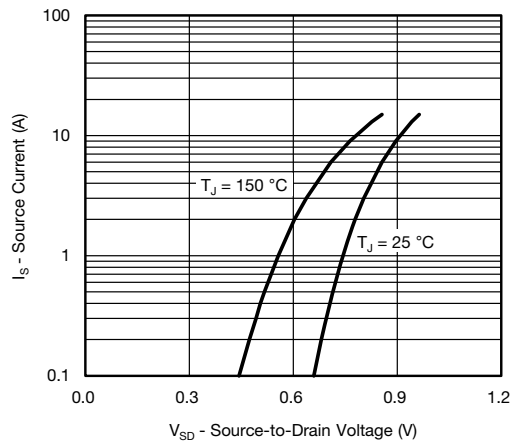


Gate Charge

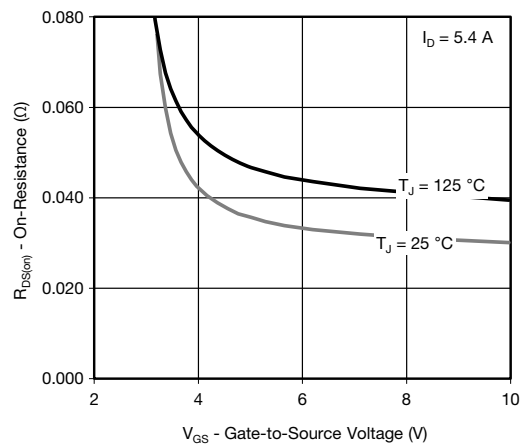


On-Resistance vs. Junction Temperature

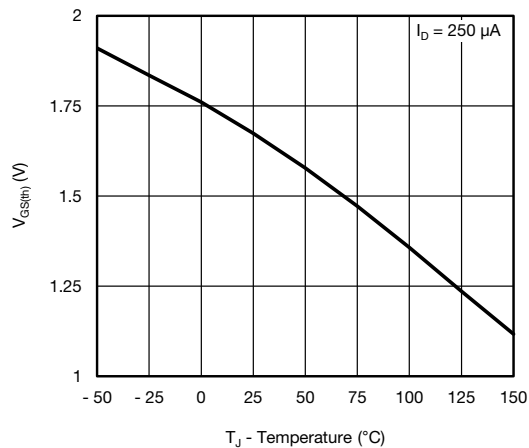
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



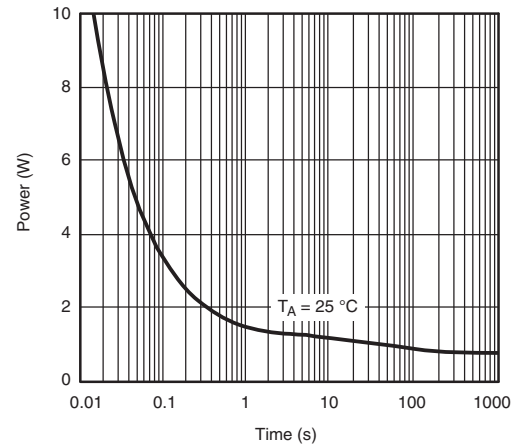
Source-Drain Diode Forward Voltage



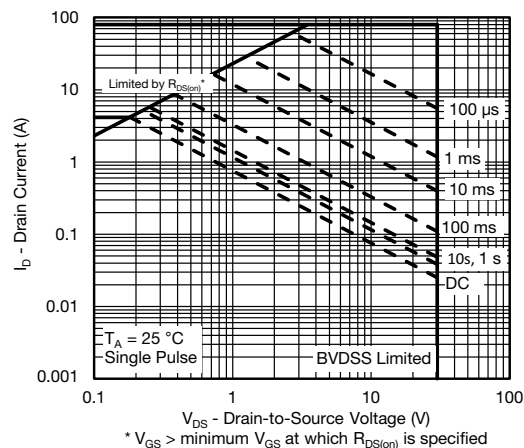
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

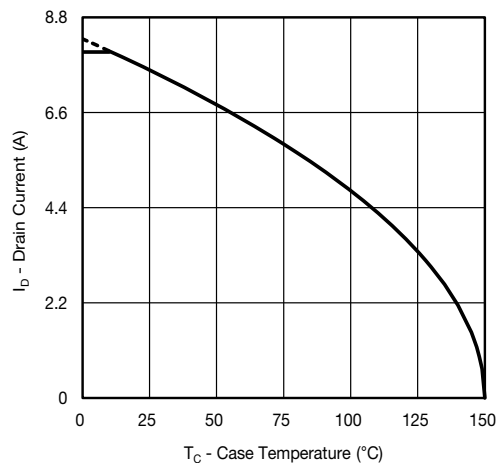


Single Pulse Power (Junction-to-Ambient)

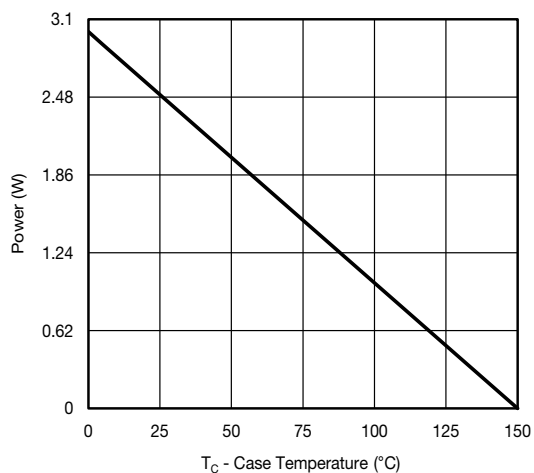


Safe Operating Area, Junction-to-Ambient

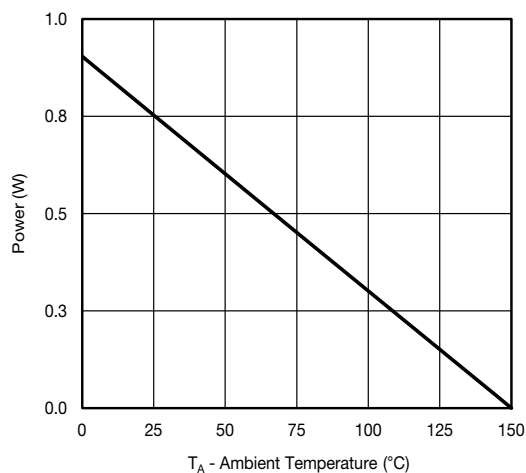
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



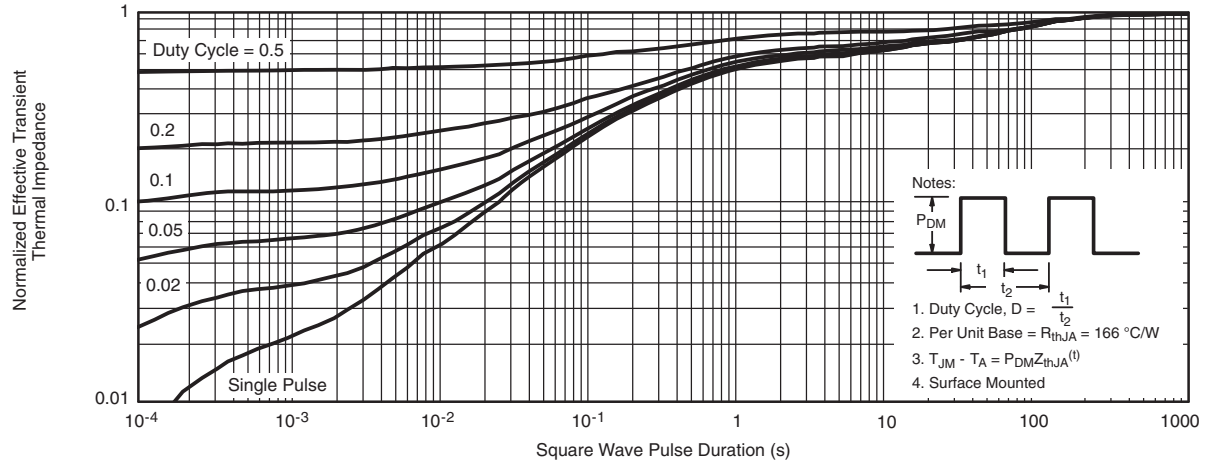
Power, Junction-to-Foot



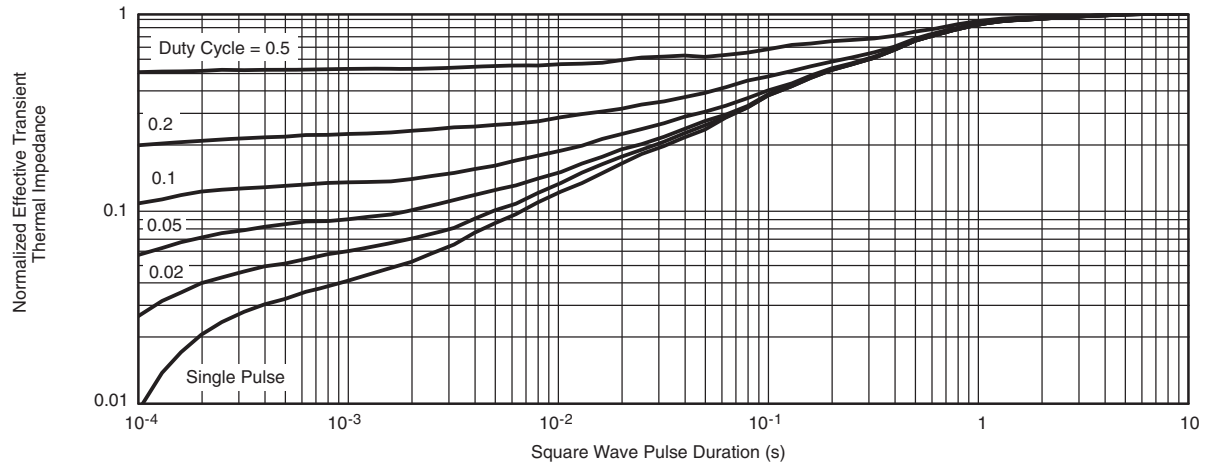
Power, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

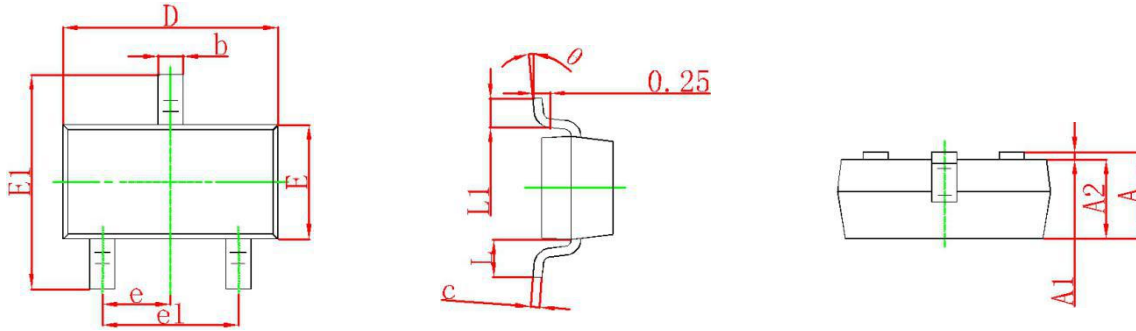


Normalized Thermal Transient Impedance, Junction-to-Ambient



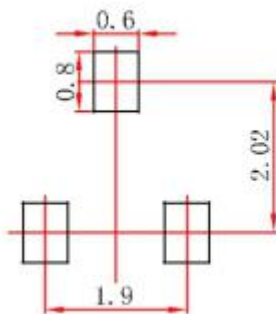
Normalized Thermal Transient Impedance, Junction-to-Foot

SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 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.