



**30V P-Channel MOSFET**

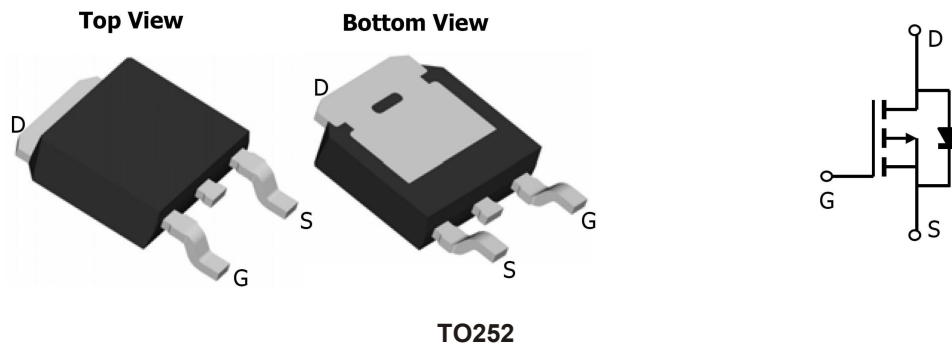
● **Features**

- 30V70A ,
- $R_{DS(ON)} < 7.8m\Omega @ V_{GS} = -10V$
- $R_{DS(ON)} < 11m\Omega @ V_{GS} = -4.5V$
- Lead Free Available (RoHS Compliant)

● **General Description**

The FS70P03 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The FS70P03 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

● **Pin Configuration**



● **Absolute Maximum Ratings**  $T_A=25^\circ C$  unless otherwise noted

Parameter		Symbol	Maximum	Units	
Drain-Source Voltage		$V_{DS}$	-30	V	
Gate-Source Voltage		$V_{GS}$	$\pm 20$		
Continuous Drain Current, $V_{GS} @ -10V^1$	$T_C=25^\circ C$	$I_D$	-70	A	
	$T_C=100^\circ C$		-40		
	$T_A=25^\circ C$		-11.3		
	$T_A=70^\circ C$		-9		
Pulsed Drain Current <sup>2</sup>		$I_{DM}$	-180		
Avalanche Current		$I_{AS}$	-55.4		
Single Pulse Avalanche Energy <sup>3</sup>		$E_{AS}$	153	mJ	
Total Power Dissipation <sup>4</sup>	$T_A=25^\circ C$	$P_D$	2	W	
	$T_C=25^\circ C$		52.1		
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 to 150	$^\circ C$	
<b>Thermal Characteristics</b>					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>1</sup>	$t \leq 10s$	$R_{\theta JA}$	---	25	$^\circ C/W$
	Maximum Junction-to-Ambient <sup>1</sup>		Steady-State	---	
Maximum Junction-to-Case <sup>1</sup>		$R_{\theta JC}$		---	



● Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0	T <sub>J</sub> =25°C		-1	μA
			T <sub>J</sub> =25°C		-5	
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±25V			±0.1	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250μA	-1		-2.5	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A		6.8	7.8	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A		9.0	11	
g <sub>FS</sub>	Forward Trans conductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-30A		26.4		S
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			-1.2	V
I <sub>S</sub>	Continuous Source Curren <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current			-70	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>				-190	
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		3448		pF
C <sub>oss</sub>	Output Capacitance			508		
C <sub>rss</sub>	Reverse Transfer Capacitance			421		
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge(-4.5V)	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-15A		33		nC
Q <sub>gs</sub>	Gate Source Charge			10.7		
Q <sub>gd</sub>	Gate Drain Charge			12.8		
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-15A, R <sub>G</sub> =3.3Ω		8		ns
t <sub>r</sub>	Turn-On Rise Time			17.8		
t <sub>D(off)</sub>	Turn-Off Delay Time			78.4		
t <sub>f</sub>	Turn-Off Fall Time			43.6		
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-15A, dI/dt=100A/μs, T <sub>J</sub> =25°C		29		
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-15A, dI/dt=100A/μs, T <sub>J</sub> =25°C		15		nC

Note:

A: Th1. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2. The data tested by pulsed , pulse width ≅ 300us , duty cycle ≅ 2%

3. The EAS data shows Max. rating . The test condition is VDD=-25V, VGS=-10V, L=0.1mH, IAS=-55.4A

4. The power dissipation is limited by 150°C junction temperature

5. The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.



## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

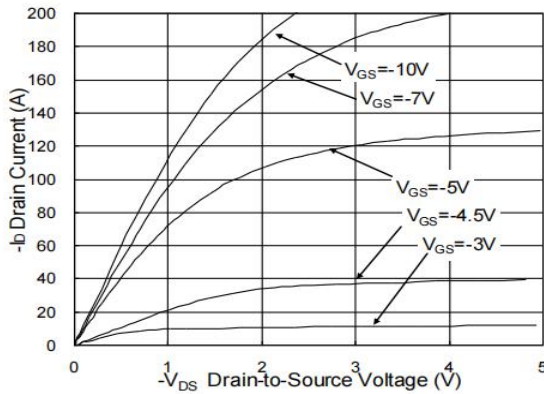


Fig.1 Typical Output Characteristics

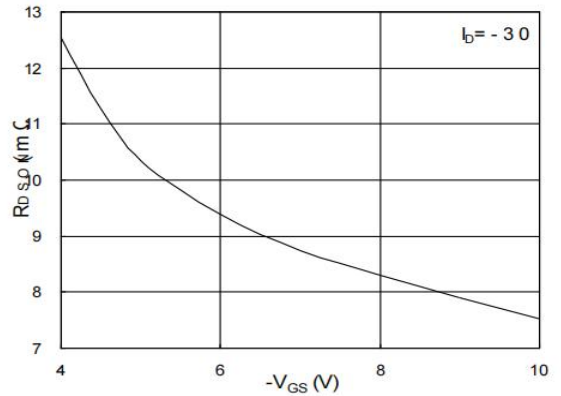


Fig.2 On-Resistance v.s Gate-Source

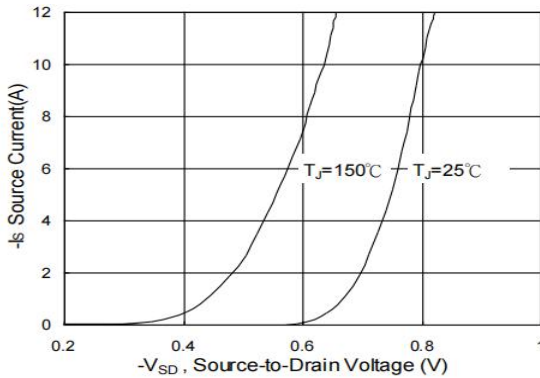


Fig.3 Forward Characteristics Of Reverse

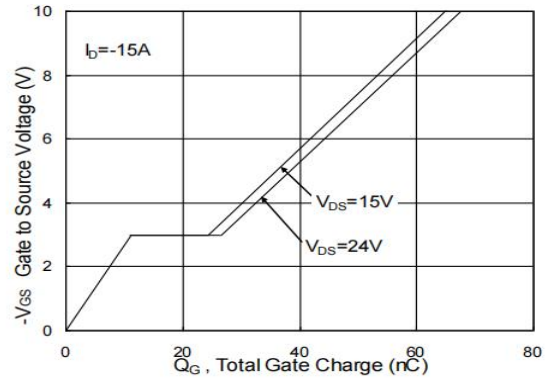


Fig.4 Gate-Charge Characteristics

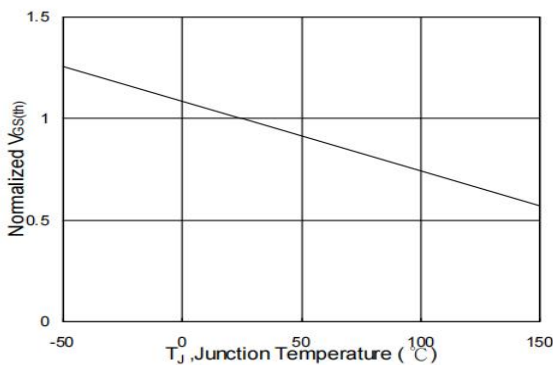


Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$

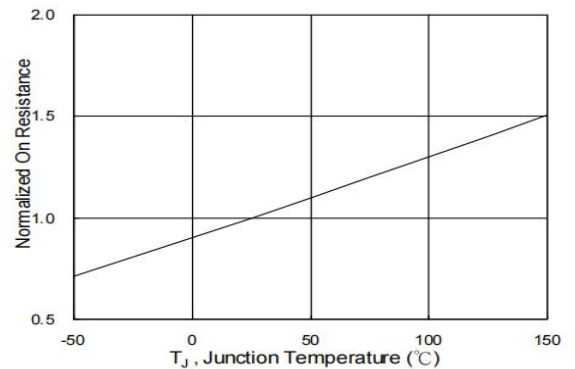


Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$

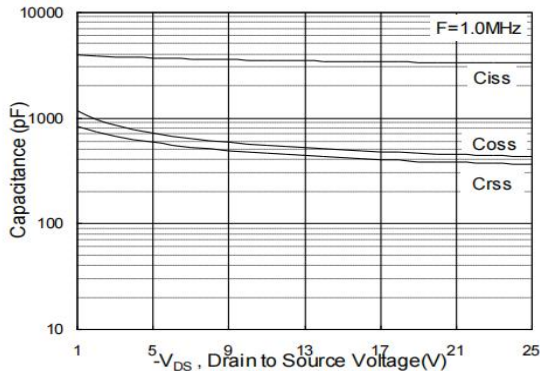


Fig. 7 Capacitance

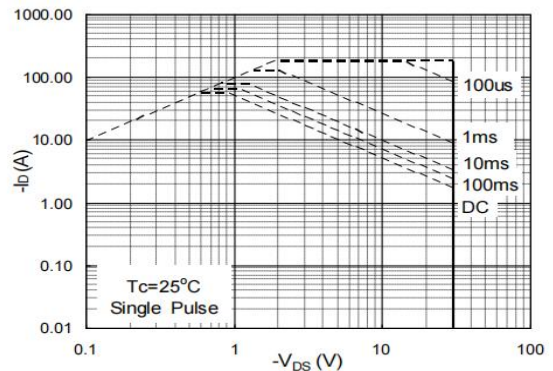


Fig. 8 Safe Operating Area

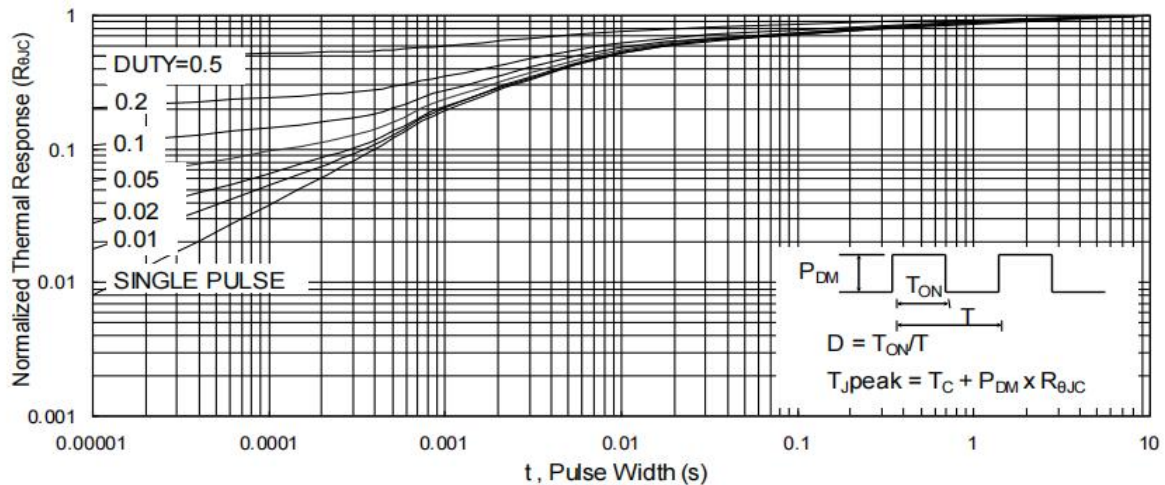


Fig. 9 Normalized Maximum Transient Thermal Impedance

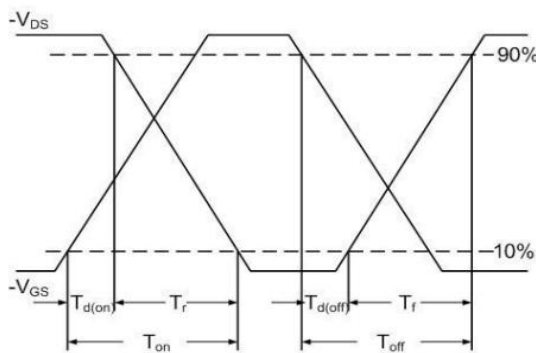


Fig. 10 Switching Time Waveform

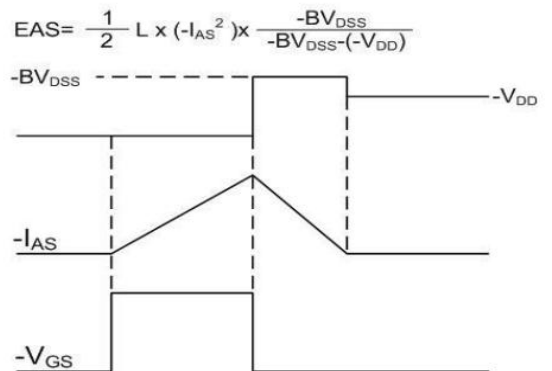
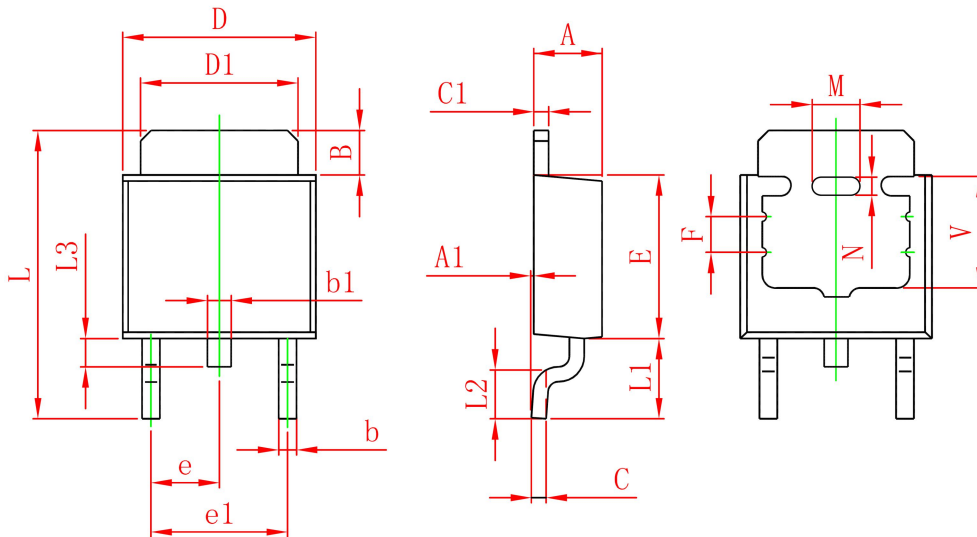


Fig. 11 Unclamped Inductive Switching Waveform



● **Package Information**

**TO-252C-2L PACKAGE OUTLINE DIMENSIONS**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
F	1.200REF.		0.047REF.	
M	1.600REF.		0.063REF.	
N	0.450REF.		0.018REF.	
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF		0.150 REF	