

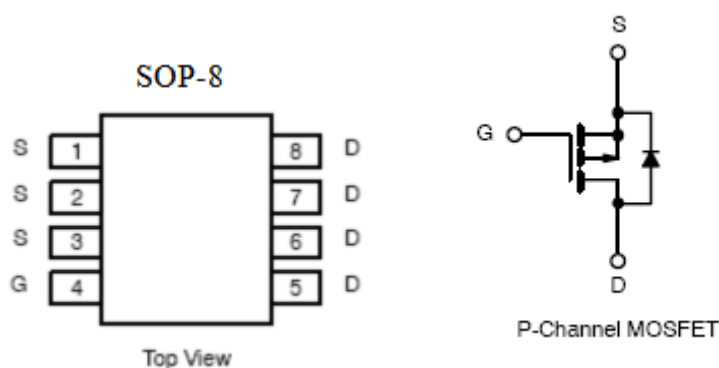
1. Features

- n $R_{DS(on)}=18m\Omega$ (typ) @ $V_{GS}=-10V$
- n Super low gate charge
- n Green device available
- n Excellent Cdv/dt effect decline
- n Advanced high cell density trench technology

2. Description

The KIA7P03A is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The KIA7P03A meet the RoHs and Green Product requirement.

3. Symbol



4. Absolute maximum ratings

($T_A=25^{\circ}C$, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-source voltage	V_{DSS}	-30	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current V_{GS} @-10V ¹	I_D	$T_A=25^{\circ}C$	-7.5
		$T_A=70^{\circ}C$	-6
Pulsed drain current ²	I_{DM}	-50	A
Single pulse avalanche energy ³	EAS	72.2	mJ
Avalanche current	I_{AS}	-38	A
Total power dissipation ⁴	P_D	$T_A=25^{\circ}C$	3.1
		$T_A=70^{\circ}C$	2
Junction and storage temperature range	T_J, T_{STG}	-55 to 150	$^{\circ}C$
Thermal resistance-junction to ambient ¹	$R_{\theta JA}$	75	$^{\circ}C/W$
Thermal resistance-junction to ambient ¹ ($t \leq 10s$)		40	
Thermal resistance-junction to case ¹		$R_{\theta JC}$	

5. Electrical characteristics

($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
BV_{DSS} Temperature coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Reference to 25°C , $I_D=1\text{mA}$	-	0.022	-	V/ $^{\circ}\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-24V, V_{GS}=0V,$ $T_J=25^{\circ}\text{C}$	-	-	-1	μA
		$V_{DS}=-24V, V_{GS}=0V,$ $T_J=55^{\circ}\text{C}$	-	-	-5	
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	-1	-	-2.5	V
$V_{GS(th)}$ Temperature coefficient	$\Delta V_{GS(th)}$		-	4.6	-	$\text{mV}/^{\circ}\text{C}$
Static drain-source on- resistance ²	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-6A$	-	18	20	m Ω
		$V_{GS}=-4.5V, I_D=-4A$	-	27	32	
Forward transconductance	g_{FS}	$V_{DS}=-5V, I_D=-6A$	-	17	-	S
Gate resistance	R_g	$V_{DS}=0V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	13	-	Ω
Total gate charge(-4.5V)	Q_g	$V_{DS}=-15V, V_{GS}=-4.5V$ $I_D=-6A$	-	12.6	-	nC
Gate-source charge	Q_{gs}		-	4.8	-	
Gate-drain charge	Q_{gd}		-	4.8	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15V,$ $R_G=3.3\Omega, V_{GS}=-10V$ $I_D=-6A$	-	4.6	-	ns
Rise time	t_r		-	14.8	-	
Turn-off delay time	$t_{d(off)}$		-	41	-	
Fall time	t_f		-	19.6	-	
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=-15V$ $F=1.0\text{MHz}$	-	1345	-	pF
Output capacitance	C_{oss}		-	194	-	
Reverse transfer capacitance	C_{rss}		-	158	-	
Diode characteristics						
Continuous source current ^{1,5}	I_S	$V_G=V_D=0V, \text{Force}$ current	-	-	-7.5	A
Pulsed source current ^{2,5}	I_{SM}		-	-	-50	A
Diode forward voltage ²	V_{SD}	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	-	-	-1.2	V
Reverse recovery time	t_{rr}	$I_F=-6A, dI/dt=100A/\mu s,$ $T_J=25^{\circ}\text{C}$	-	16.3	-	nS
Reverse recovery charge	Q_{rr}		-	5.9	-	nC

Note:1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.

2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

3. The EAS data shows Max.rating. The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}, I_{AS}=-38A$.

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

5. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

6. Test circuits and waveforms

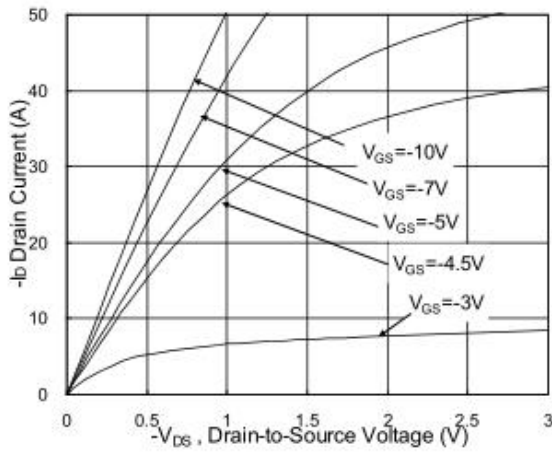


Fig.1 Typical Output Characteristics

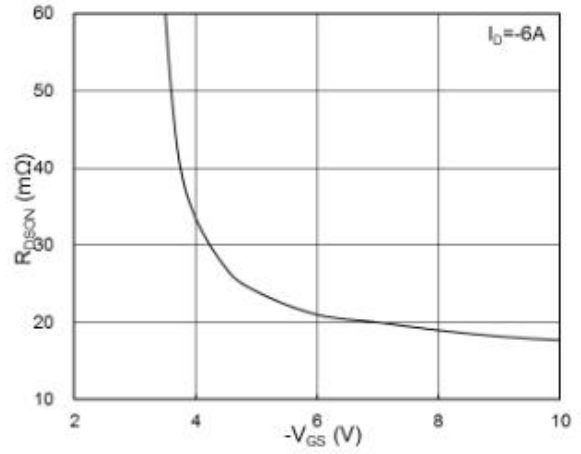


Fig.2 On-Resistance v.s Gate-Source

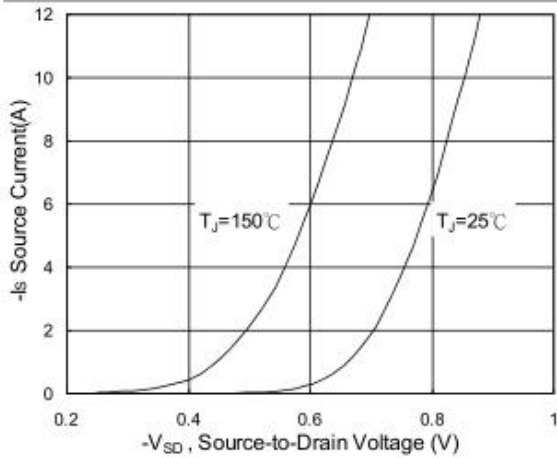


Fig.3 Forward Characteristics of Reverse

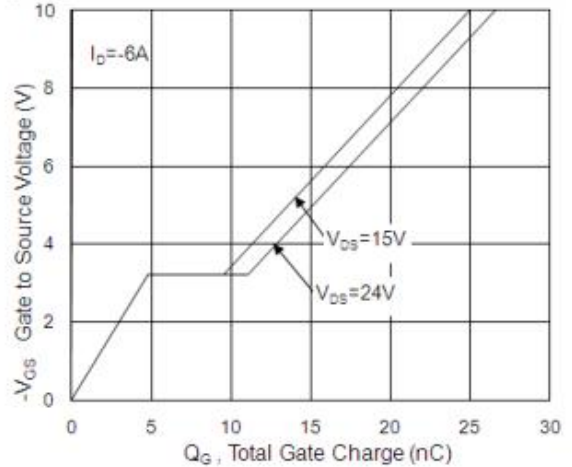


Fig.4 Gate-Charge Characteristics

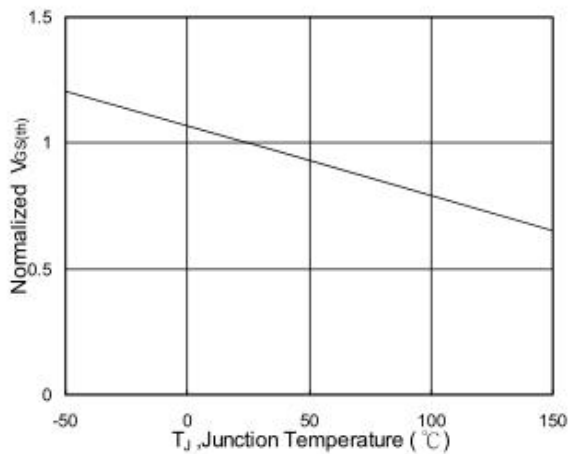


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

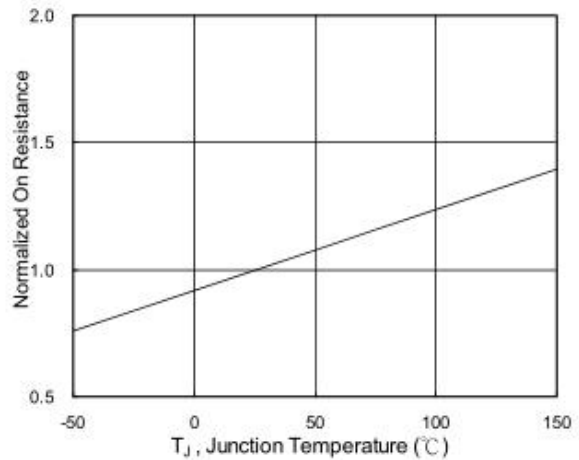


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

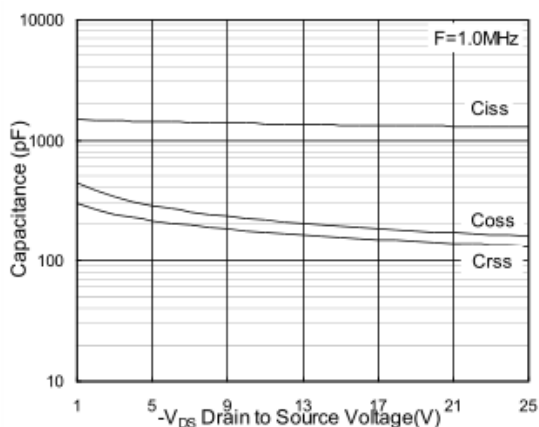


Fig.7 Capacitance

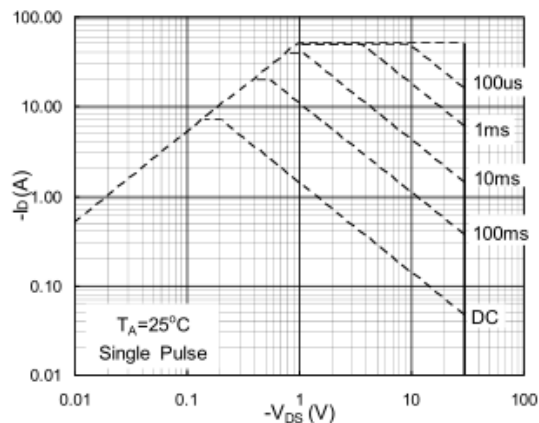


Fig.8 Safe Operating Area

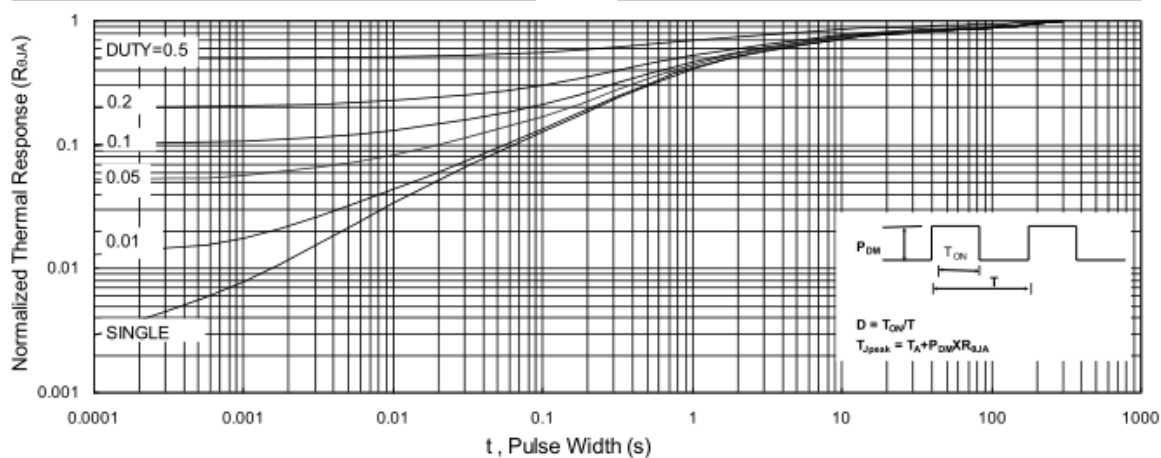


Fig.9 Normalized Maximum Transient Thermal Impedance

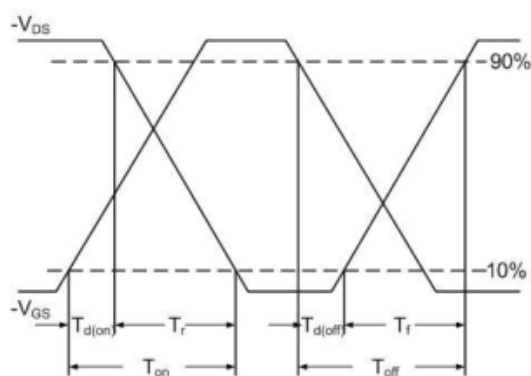


Fig.10 Switching Time Waveform

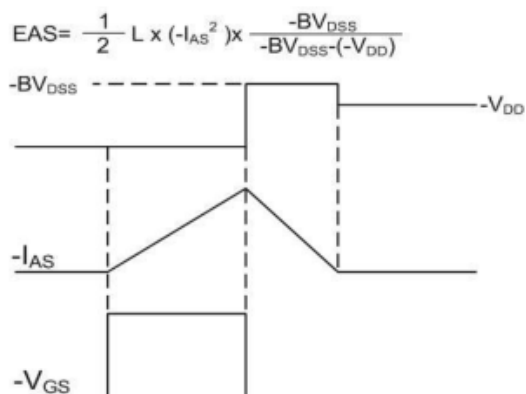


Fig.11 Unclamped Inductive Switching Waveform