

Si6943DQ

Dual P-Channel 2.5V Specified PowerTrench® MOSFET

General Description

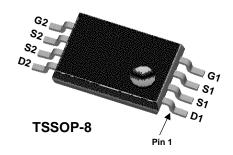
This P-Channel -2.5V specified MOSFET is a rugged gate version of Fairchild's Semiconductor's advanced PowerTrench process. It has been optimized for power management applications with a wide range of gate drive voltage (-2.5V to -8V).

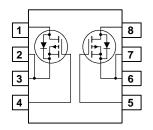
Applications

- Load switch
- Motor drive
- DC/DC conversion
- Power management

Features

- -2.5 A, -12 V, $R_{DS(ON)} = 110$ m Ω @ $V_{GS} = -4.5$ V. $R_{DS(ON)} = 180$ m Ω @ $V_{GS} = -2.5$ V.
- $\bullet~$ Extended V_{GSS} range (±8V) for battery applications
- Low gate charge (4.6nC typical)
- High performance trench technology for extremely low $R_{\mbox{\scriptsize DS(ON)}}$
- Low profile TSSOP-8 package





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V _{DSS}	Drain-Source Voltage		-12	V
V _{GSS}	Gate-Source Voltage		±8	V
I _D	Drain Current - Continuous	(Note 1)	-2.5	А
	- Pulsed		-20	
P _D	Power Dissipation for Single Operation	(Note 1a)	1.0	W
		(Note 1b)	0.6	
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	100	°C/W
		(Note 1b)	125	

Package Marking and Ordering Information

_			<u> </u>		
_	Device Marking	Device	Reel Size	Tape width	Quantity
_	6943	Si6943DQ	13"	12mm	2500 units

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics		•	•	•	•
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, \qquad I_{D} = -250 \mu\text{A}$	-12			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = -250 μ A, Referenced to 25°C		-13		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -12 \text{ V}, \qquad V_{GS} = 0 \text{ V}$			-1	μΑ
I _{GSSF}	Gate-Body Leakage, Forward	$V_{GS} = -8 \text{ V}, \qquad V_{DS} = 0 \text{ V}$			-100	nA
I _{GSSR}	Gate-Body Leakage, Reverse	$V_{GS} = 8 \text{ V}, \qquad V_{DS} = 0 \text{ V}$			100	nA
On Char	acteristics (Note 2)					
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250 \mu A$	-0.6	-0.9	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250 \mu A$, Referenced to 25°C		3		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	$V_{GS} = -4.5 \text{ V}, I_D = -2.5 \text{ A}$ $V_{GS} = -2.5 \text{ V}, I_D = -1.9 \text{ A}$ $V_{GS} = -4.5 \text{ V}, I_D = -2.5 \text{ A}, T_J = 125^{\circ}\text{C}$		89 125 116	110 180 154	mΩ
I _{D(on)}	On–State Drain Current	$V_{GS} = -4.5 \text{ V}, I_D = -2.5 \text{ A}, T_J=125^{\circ}\text{C}$ $V_{GS} = -4.5 \text{ V}, V_{DS} = -5 \text{ V}$	-10			Α
g FS	Forward Transconductance	$V_{DS} = -9 \text{ V}, \qquad I_{D} = -2.5 \text{ A}$		7		S
Dvnamio	Characteristics		•	•	•	•
C _{iss}	Input Capacitance	$V_{DS} = -6 \text{ V}, \qquad V_{GS} = 0 \text{ V},$		509		pF
Coss	Output Capacitance	f = 1.0 MHz		97		pF
C _{rss}	Reverse Transfer Capacitance			43		pF
Switchir	g Characteristics (Note 2)		1	I		
t _{d(on)}	Turn-On Delay Time	$V_{DD} = -6 \text{ V}, \qquad I_D = -1 \text{ A},$		9	18	ns
t _r	Turn-On Rise Time	$V_{GS} = -4.5 \text{ V}, \qquad R_{GEN} = 6 \Omega$		12	22	ns
t _{d(off)}	Turn-Off Delay Time			17	31	ns
t _f	Turn-Off Fall Time			8	16	ns
Q _g	Total Gate Charge	$V_{DS} = -6V$, $I_D = -2.5 A$,		4.6	6.4	nC
Q _{gs}	Gate-Source Charge	$V_{GS} = -4.5 \text{ V}$		1.1		nC
Q _{qd}	Gate-Drain Charge			0.7		nC
	ource Diode Characteristics	and Maximum Ratings	1	ı	1	1
I _s	Maximum Continuous Drain–Sourc				-1	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, \qquad I_{S} = -1 \text{ A} \text{(Note 2)}$		0.8	-1.2	V

^{1.} R_{BJA} 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.

a) $R_{\theta JA}$ is 100°C/W (steady state) when mounted on a 1 inch² copper pad on FR-4. b) $R_{\theta JA}$ is 125°C/W (steady state) when mounted on a minimum copper pad on FR-4.

^{2.} Pulse Test: Pulse Width < 300µs, Duty Cycle < 2.0%

Typical Characteristics

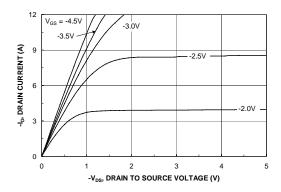


Figure 1. On-Region Characteristics.

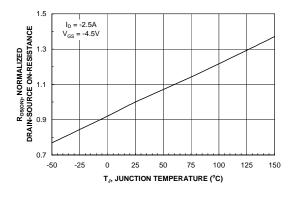


Figure 3. On-Resistance Variation with Temperature.

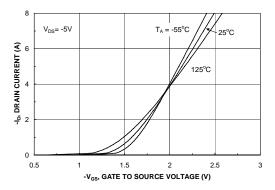


Figure 5. Transfer Characteristics.

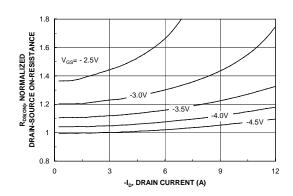


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

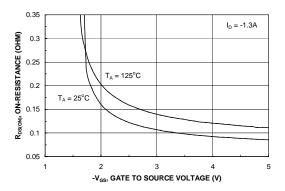


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

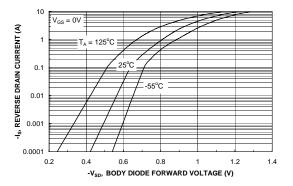
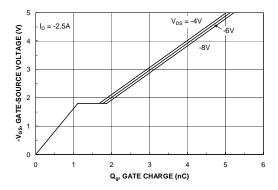


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics



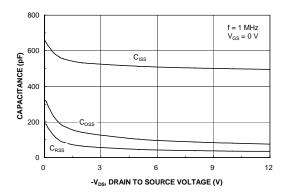
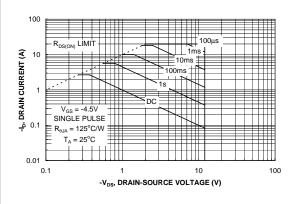


Figure 7. Gate Charge Characteristics.





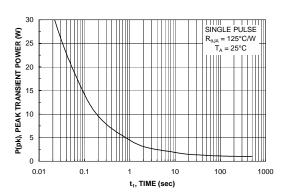


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

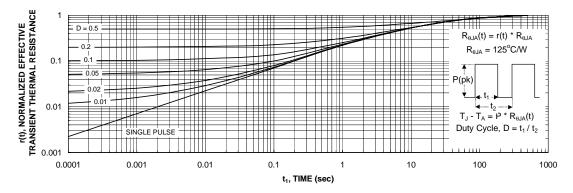


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

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