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FDC6392S

20V Integrated P-Channel PowerTrench® MOSFET and Schottky Diode

General Description

The FDC6392S combines the exceptional performance of Fairchild's PowerTrench MOSFET technology with a very low forward voltage drop Schottky barrier rectifier in an SSOT-6 package.

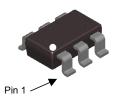
This device is designed specifically as a single package solution for DC to DC converters. It features a fast switching, low gate charge MOSFET with very low onstate resistance. The independently connected Schottky diode allows its use in a variety of DC/DC converter topologies.

Features

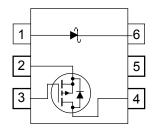
MOSFET:

- -2.2 A, -20V. $R_{DS(ON)}$ = 150 m Ω @ V_{GS} = -4.5V $R_{DS(ON)}$ = 200 m Ω @ V_{GS} = -2.5V
- Low Gate Charge (3.7nC typ)
- Compact industry standard SuperSOT[™]-6 package
 Schottky:

• V_F < 0.45 V @ 1 A



SuperSOT™-6



Absolut	e Maximum	Ratings	T _A =25°C unless otherwise note	d

Symbol	Parameter		Ratings	Units	
V _{DSS}	MOSFET Drain-Source Voltage		-20	V	
V _{GSS}	MOSFET Gate-Source Voltage		±12	V	
I _D	Drain Current - Continuous	(Note 1a)	-2.2	А	
	– Pulsed		-6		
P _D	Power Dissipation for Single Operation	(Note 1a)	0.96	W	
		(Note 1b)	0.9		
		(Note 1c)	0.7		
T _J , T _{STG}	Operating and Storage Junction Temperature Range		–55 to +150	°C	
V_{RRM}	Schottky Repetitive Peak Reverse Voltage		20	V	
Io	Schottky Average Forward Current	(Note 1a)	1	А	

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	130	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	60	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity	
.392	FDC6392S	7"	8mm	3000 units	

Symbol	Parameter	Test Cor	nditions	Min	Тур	Max	Units
Off Char	acteristics			Į.	<u>I</u>	l	
BV _{DSS}	Drain–Source Breakdown Voltage	V _{GS} = 0 V, I _D =	: _250 µA	-20			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}, \text{Refe}$	•	20	-16		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16 \text{ V}, V_{GS}$	s = 0 V			– 1	μА
I _{GSSF}	Gate–Body Leakage, Forward	$V_{GS} = 12 \text{ V}, V_{DS}$				100	nA
I _{GSSR}	Gate–Body Leakage, Reverse	$V_{GS} = -12 \text{ V}, V_{DS}$				-100	nA
On Char	acteristics (Note 2)	1		I		1	
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} =$: –250 uA	-0.6	-1.0	-1.5	V
$\Delta V_{GS(th)} \over \Delta T_J$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$, Refe			3		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	$V_{GS} = -4.5 \text{ V}, I_D = V_{GS} = -2.5 \text{ V}, I_D = V_{GS} = -4.5 \text{ V}, I_D = -2.5 \text{ V}$: –1.8 A		101 152 132	150 200 211	mΩ
I _{D(on)}	On-State Drain Current	$V_{GS} = -4.5 \text{ V}, V_{DS}$		-6			Α
g _{FS}	Forward Transconductance	$V_{DS} = -5 \text{ V}, I_D =$			6		S
Dynamic	Characteristics	1		1	I	ı	
C _{iss}	Input Capacitance	V _{DS} = -10 V, V _G	a = 0 V		369		pF
Coss	Output Capacitance	f = 1.0 MHz	1		80		pF
C _{rss}	Reverse Transfer Capacitance				39		pF
R _G	Gate Resistance	V _{GS} = -15 mV, f = 1.0 MHz			7.6		Ω
	1	1 63					
t _{d(on)}	g Characteristics (Note 2) Turn-On Delay Time	V _{DD} = -10 V, I _D =	: _1 Δ		8	16	ns
t _r	Turn–On Rise Time	· ·	$V_{GS} = -4.5 \text{ V}, R_{GEN} = 6 \Omega$		11	20	ns
t _{d(off)}	Turn–Off Delay Time	1		-	13	23	ns
t _f	Turn–Off Fall Time				4	8	
	Total Gate Charge	V _{DS} = -10 V, I _D =	: _2 2 A		3.7	5.2	ns nC
$\frac{Q_g}{Q_g}$	•	$V_{GS} = -10 \text{ V}, I_D = -2.2 \text{ A},$ $V_{GS} = -4.5 \text{ V}$				5.2	
Q _{gs}	Gate-Source Charge				1		nC nC
Q _{gd}	Gate-Drain Charge		_				IIC
	ource Diode Characteristics			1	I		Δ.
I _S	Maximum Continuous Drain–Source	1				-0.8	A
V _{SD}	Voltage	$V_{GS} = 0 V$, $I_S =$: -0.8 A(Note 2)		-0.8	-1.2	V
t _{rr}	Diode Reverse Recovery Time	$I_F = -2.2 \text{ A},$			5.4		nS
Q _{rr}	Diode Reverse Recovery Charge	$d_{iF}/d_t = 100 \text{ A/}\mu\text{s}$			1.2		nC
Schottky	Diode Characteristics	•		•	•		
I _R	Reverse Leakage	V _R = 20 V	T _J = 25°C		148	400	μА
			T _J = 100°C		14	20	mA
		V _R = 10V	T _J = 25°C		55	200	μΑ
			T _J = 100°C		5.2	10	mA
V _F	Forward Voltage	I _F = 500mA	T _J = 25°C		0.34	0.4	V
	_		T _J = 100°C		0.26	0.35	
		I _F = 1 A	T _J = 25°C		0.40	0.45	V
		" ' ' ' '	T _J = 100°C		0.35	0.42	•

Electrical Characteristics

T_A = 25°C unless otherwise noted

Notes

 R_{8JA} 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_{8JC} is guaranteed by design while R_{8CA} is determined by the user's board design.



a) 130 °C/W when mounted on a 0.125 in² pad of 2 oz. copper.



b) 140°C/W when mounted on a .004 in² pad of 2 oz copper



c) 180°C/W when mounted on a minimum pad.

Scale 1: 1 on letter size paper

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

Typical Characteristics

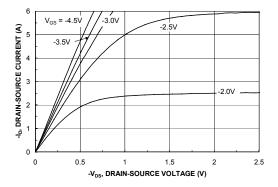


Figure 1. On-Region Characteristics.

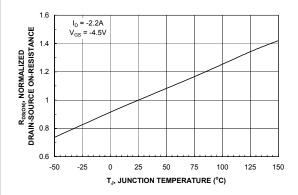


Figure 3. On-Resistance Variation with Temperature.

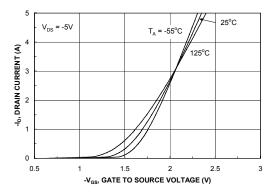


Figure 5. Transfer Characteristics.

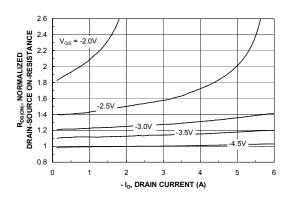


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

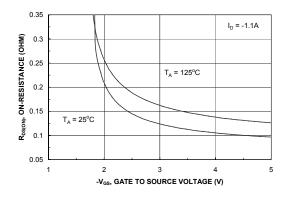


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

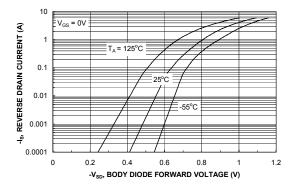
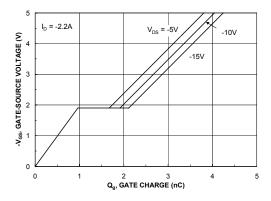


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics



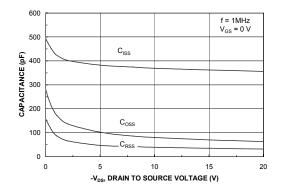
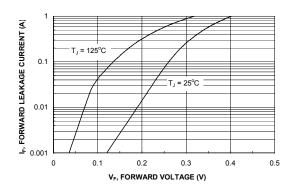


Figure 7. Gate Charge Characteristics.





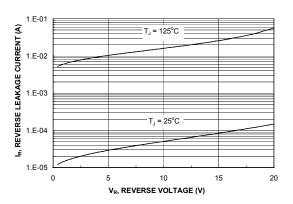


Figure 9. Schottky Diode Forward Voltage.

Figure 10. Schottky Diode Reverse Current.

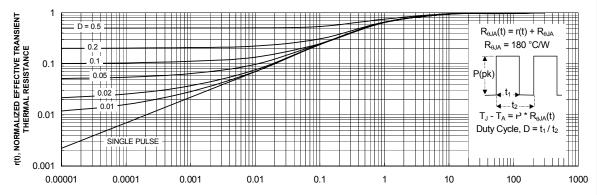


Figure 11. Transient Thermal Response Curve.

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

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