



### CST2305 P-Ch 20V Fast Switching MOSFETs

- Super Low Gate Charge
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

#### CST2305 Product Summary



BVDSS	RDSON	ID
-20V	45mΩ	-3.5A

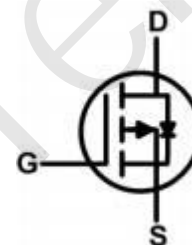
#### CST2305 Description

The CST2305 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 CST2305 meet the RoHS and Green

Product requirement with full function reliability approved.

#### CST2305 SOT 23 Pin Configurations



#### CST2305 Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-20	V
V <sub>GS</sub>	Gate-Source Voltage	±12	V
I <sub>D</sub> @ T <sub>A</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ -4.5V <sup>1</sup>	-3.5	A
I <sub>D</sub> @ T <sub>A</sub> =70°C	Continuous Drain Current, V <sub>GS</sub> @ -4.5V <sup>1</sup>	-3.0	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	-10	A
P <sub>D</sub> @ T <sub>A</sub> =25°C	Total Power Dissipation <sup>3</sup>	0.90	W
P <sub>D</sub> @ T <sub>A</sub> =70°C	Total Power Dissipation <sup>3</sup>	0.54	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

#### CST2305 Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	120	°C/ W
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤10s)	---	95	°C/ W



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#### CST2305 Electrical Characteristics (T<sub>J</sub>=25 C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-20	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25C, I <sub>D</sub> =-1mA	---	-0.014	---	V/ C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.9A	---	45	62	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-3.4A	---	65	85	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2A	---	---	---	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.4	---	-1.0	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	3.95	---	mV/ C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =25C	---	---	-1	uA
		V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =55C	---	---	-5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±12V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-3A	---	12.8	---	S
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A	---	9.2	14.3	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.89	2.6	
Q <sub>gd</sub>	Gate-Drain Charge		---	3.1	4.3	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-3A	---	5.6	11.2	ns
T <sub>r</sub>	Rise Time		---	40.8	73	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	33.6	67	
T <sub>f</sub>	Fall Time		---	18	36	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	757	1200	pF
C <sub>oss</sub>	Output Capacitance		---	104	160	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	98	151	

#### CST2305 Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-3.5	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,4</sup>		---	---	-10	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25C	---	---	-1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-3A, di/dt=100A/μs,	---	21.8	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25 C	---	6.9	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150C junction temperature
- 4.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



#### CST2305 Typical Characteristics

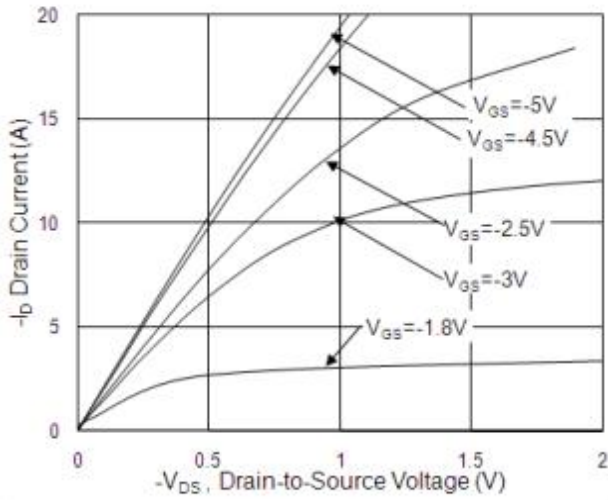


Fig. 1 Typical Output Characteristics

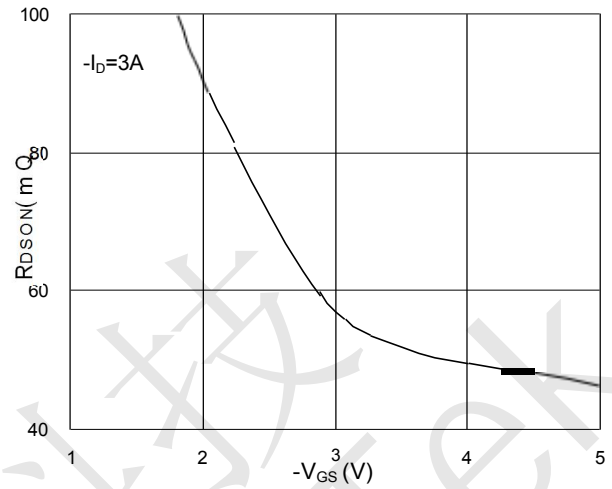


Fig. 2 On-Resistance vs. G-S Voltage

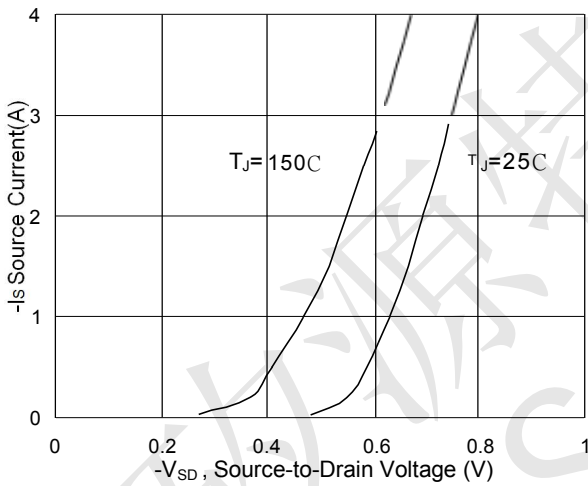


Fig. 3 Forward Characteristics of Reverse

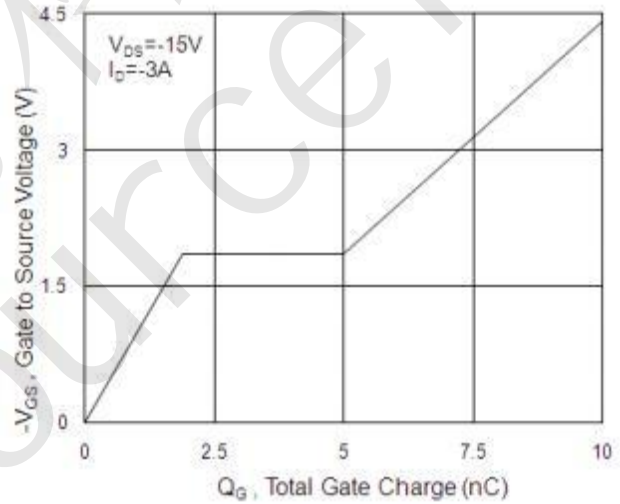


Fig. 4 Gate-charge Characteristics

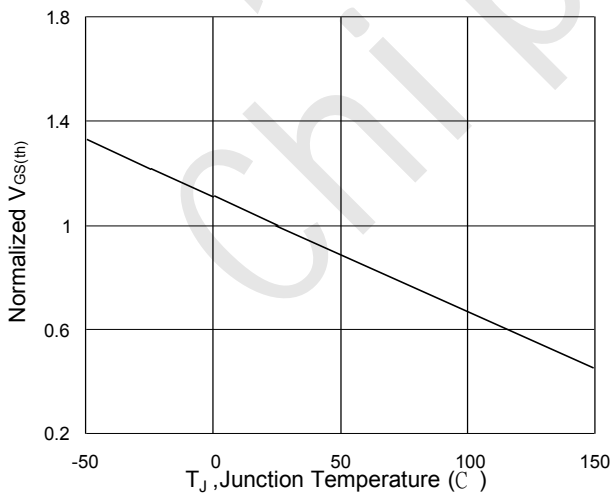


Fig. 5 Normalized  $V_{GS(th)}$  vs.  $T_J$

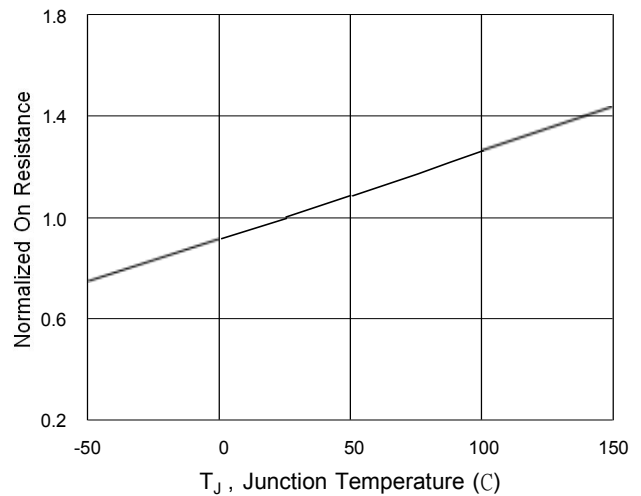


Fig. 6 Normalized  $R_{DS(on)}$  vs.  $T_J$



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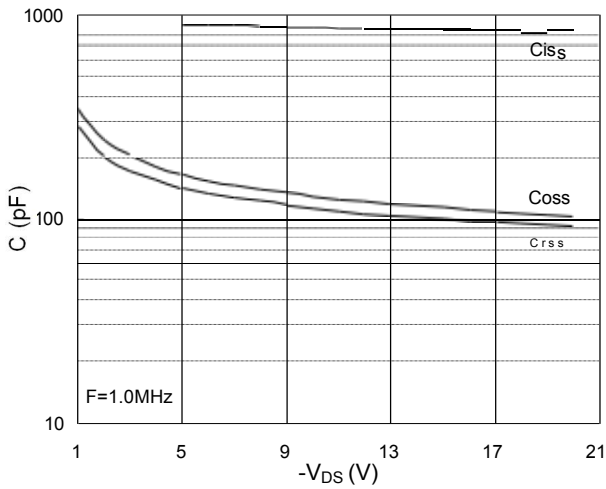


Fig. 7 Capacitance

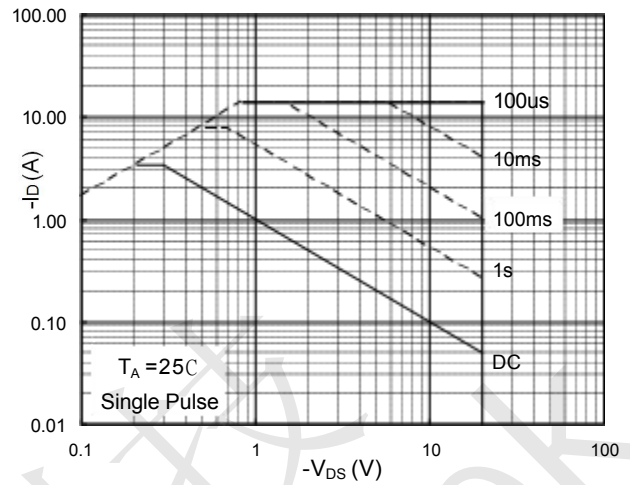


Fig. 8 Safe Operating Area

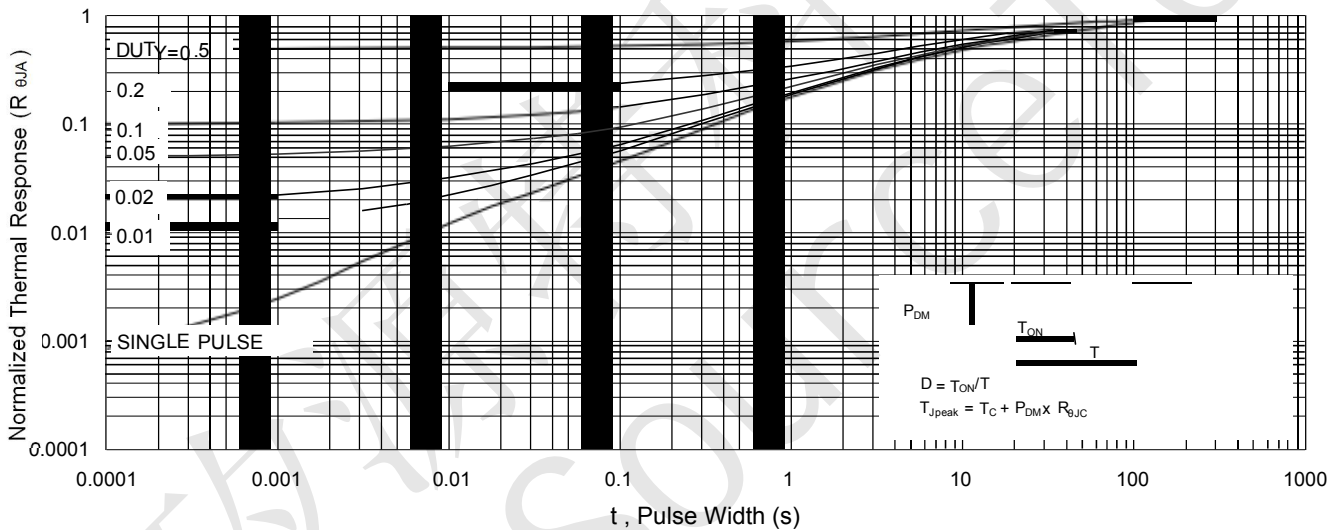


Fig. 9 Normalized Maximum Transient Thermal Impedance

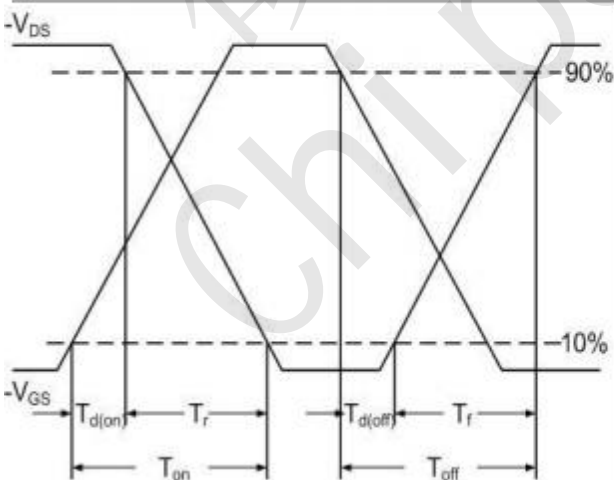


Fig. 10 Switching Time Waveform

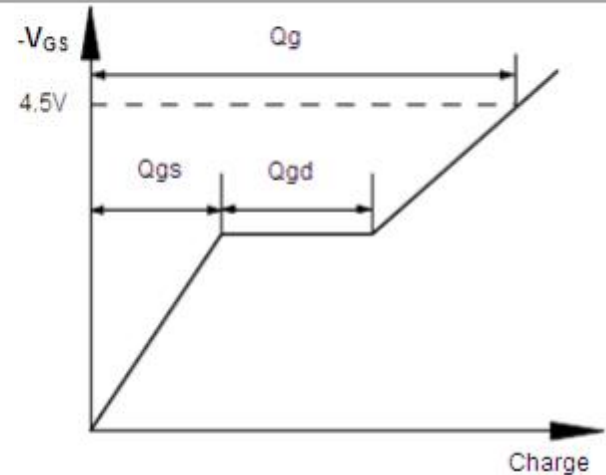
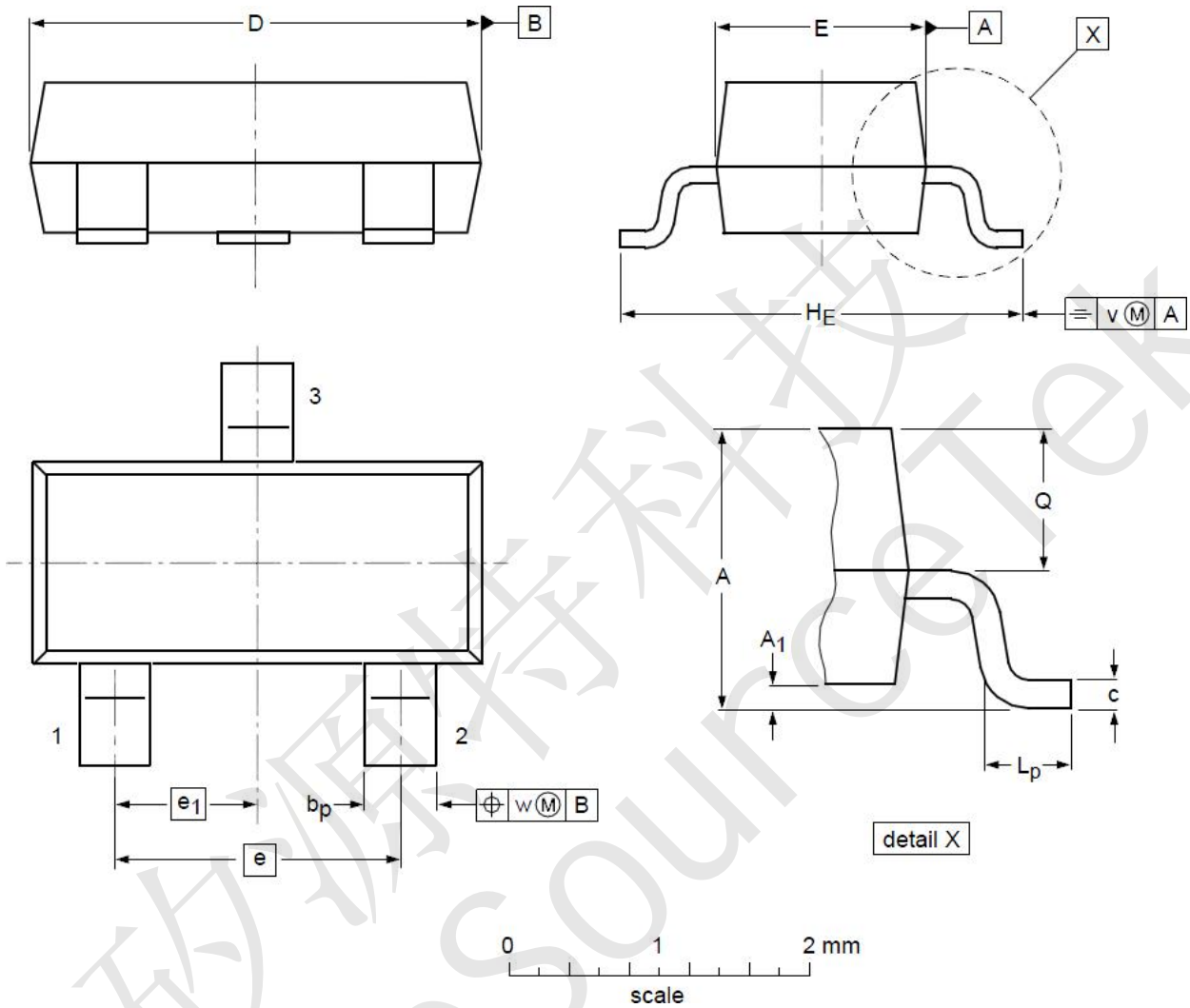


Fig. 11 Gate Charge Waveform



#### CST2305 SOT23 Mechanical Data



#### DIMENSIONS ( unit : mm )

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A <sub>1</sub>	0.01	0.05	0.10
b <sub>p</sub>	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e <sub>1</sub>	--	0.95	--
H <sub>E</sub>	2.25	2.40	2.55	L <sub>p</sub>	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				