



### CST5N20 N-Ch 200V Fast Switching MOSFETs

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

#### CST5N20 Product Summary



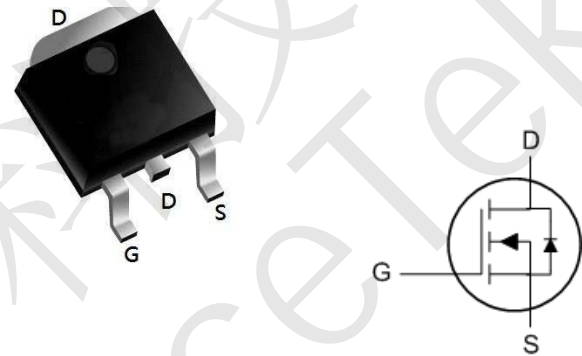
BVDSS	RDS(on)	ID
200V	450mΩ	5.5 A

#### CST5N20 Description

The CST5N20 is the high cell density trenched N-ch MOSFETs, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The CST5N20 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

#### CST5N20 TO252 Pin Configuration



#### CST5N20 Absolute Maximum Ratings:

Symbol	Parameter	Value	Units
$V_{DS}$	Drain-to-Source Voltage	200	V
$I_D$	Continuous Drain Current	5.5	A
$I_{DM}^{a1}$	Pulsed Drain Current	22	A
$V_{GS}$	Gate-to-Source Voltage	±20	V
$P_D$	Power Dissipation	30	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
$T_L$	Maximum Temperature for Soldering	260	°C

#### CST5N20 Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	4.17	°C/W



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**CST5N20 Electrical Characteristics** (TA= 25°C unless otherwise specified) :

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	200	--	--	V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V	--	--	1	μA
I <sub>GSS(F)</sub>	Gate to Source Forward Leakage	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V	--	--	100	nA
I <sub>GSS(R)</sub>	Gate to Source Reverse Leakage	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	--	--	-100	nA
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	2	3	V
R <sub>DS(ON)</sub>	Drain-to-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	--	450	550	mΩ

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = 100V f = 1.0MHz	--	461	--	pF
C <sub>oss</sub>	Output Capacitance		--	11.6	--	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	8.5	--	
R <sub>g</sub>	Gate resistance		V <sub>GS</sub> =0V, V <sub>DS</sub> Open	--	1.35	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
t <sub>d(ON)</sub>	Turn-on Delay Time	I <sub>D</sub> =2A V <sub>DS</sub> = 100V V <sub>GS</sub> = 10V R <sub>G</sub> = 4Ω	--	6	--	ns
t <sub>r</sub>	Rise Time		--	7	--	
t <sub>d(OFF)</sub>	Turn-Off Delay Time		--	17	--	
t <sub>f</sub>	Fall Time		--	8	--	
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =10V V <sub>DS</sub> = 100V I <sub>D</sub> =2A	--	11.4	--	nC
Q <sub>gs</sub>	Gate Source Charge		--	1.75	--	
Q <sub>gd</sub>	Gate Drain Charge		--	2.9	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Value
			Min.	Typ.	Max.	
I <sub>S</sub>	Diode Forward Current	T <sub>C</sub> =25 °C	--	--	5.5	A
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =2A, V <sub>GS</sub> =0V	--	--	1.2	V
t <sub>rr</sub>	Reverse Recovery time	I <sub>S</sub> =2A, V <sub>DD</sub> =100V dI/dt=100A/μs	--	75	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	198	--	nC

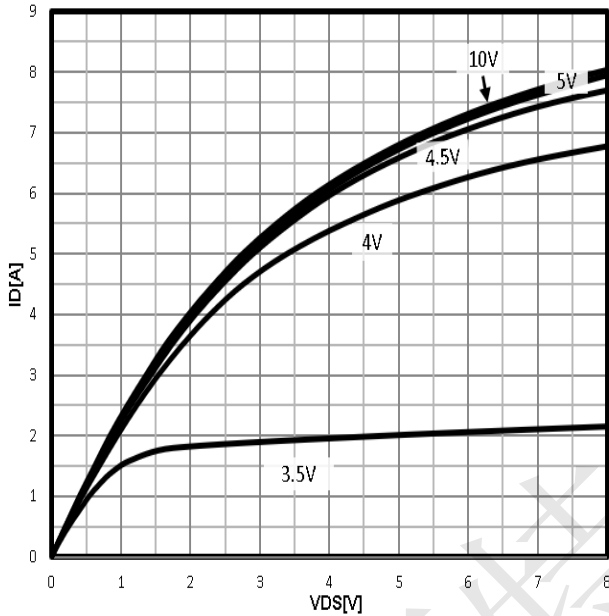
<sup>a1</sup> : Repetitive rating; pulse width limited by maximum junction temperature



### CST5N20 Characteristics Curve:

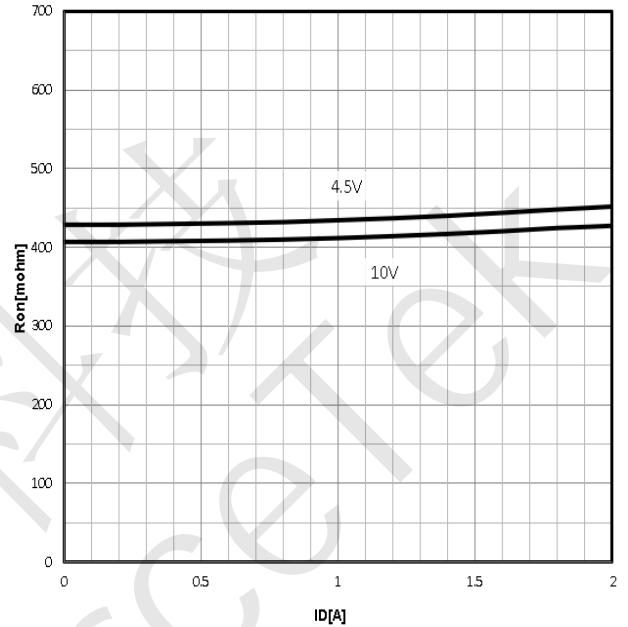
Typ. output characteristics

$$I_D = f(V_{DS})$$



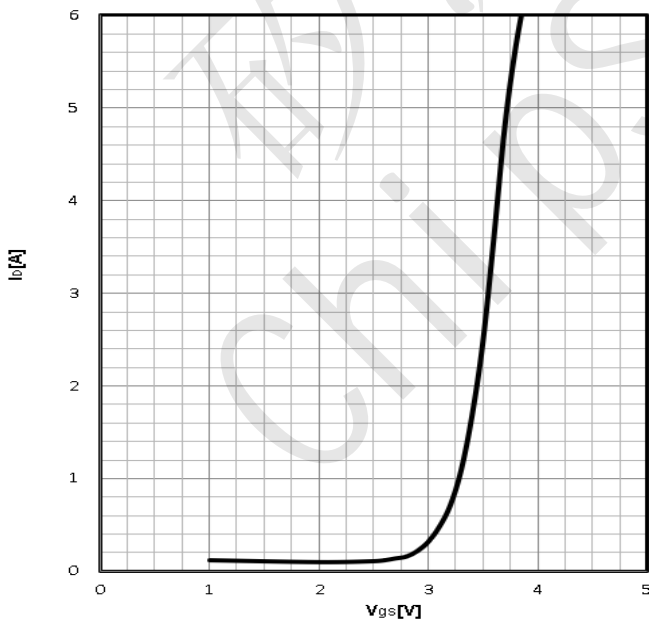
Typ. drain-source on resistance

$$R_{DS(on)} = f(I_D)$$



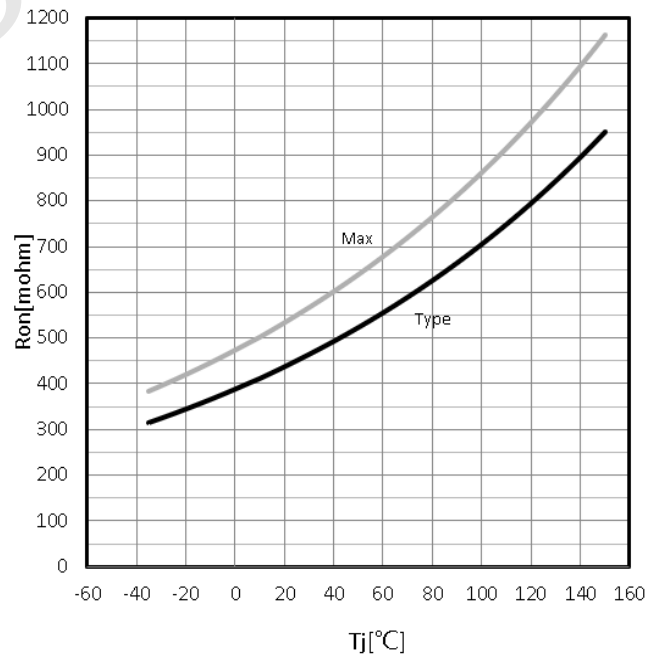
Typ. transfer characteristics

$$I_D = f(V_{GS})$$



Drain-source on-state resistance

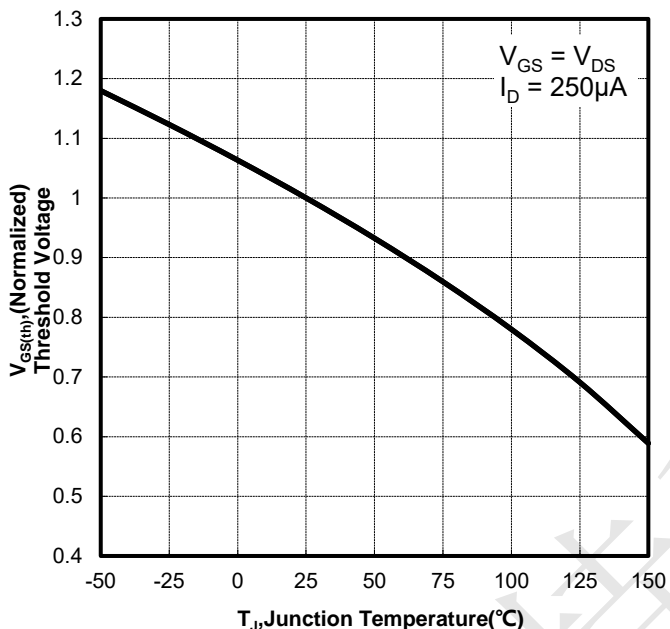
$$R_{DS(on)} = f(T_j); I_D = 2A; V_{GS} = 10V$$





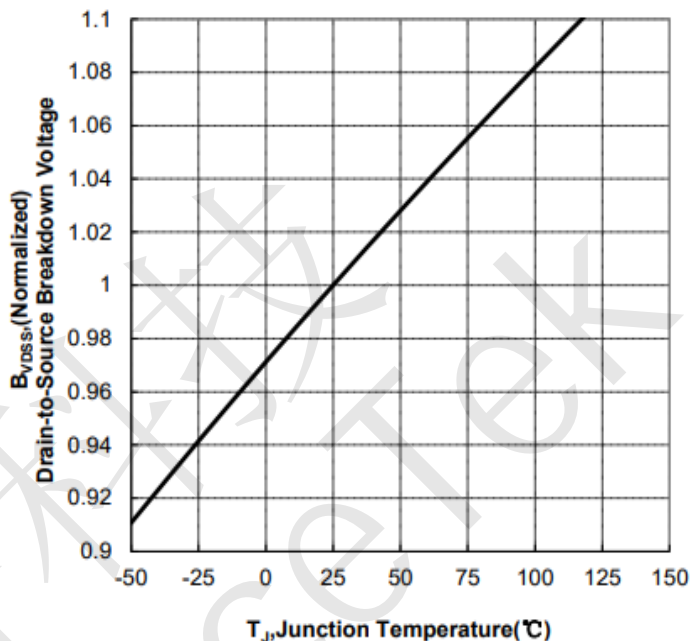
### Gate Threshold Voltage

$$V_{TH}=f(T_j); I_D=250\mu A$$



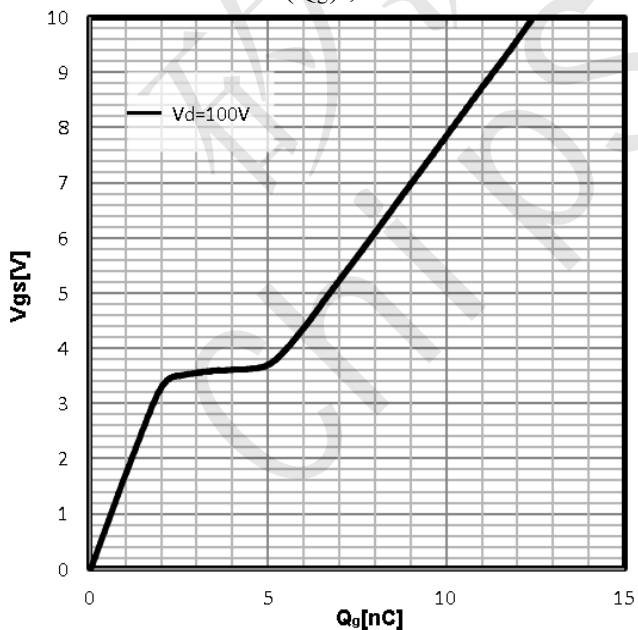
### Drain-source breakdown voltage

$$V_{BR(DSS)}=f(T_j); I_D=250\mu A$$



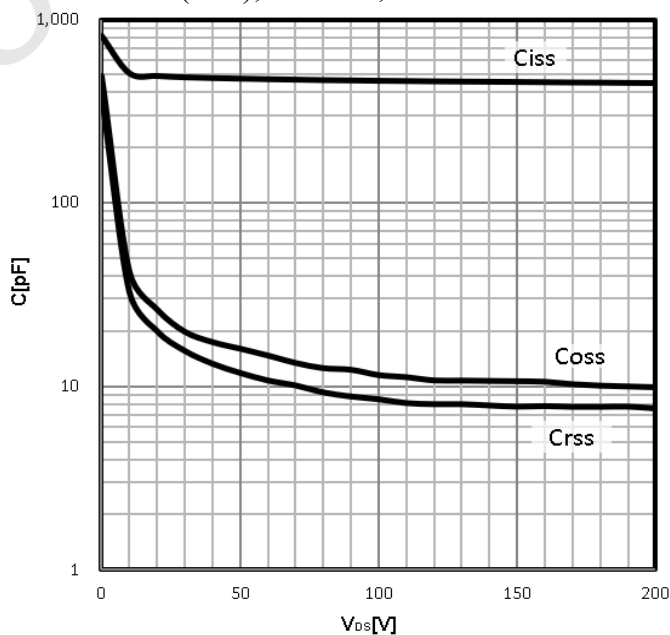
### Typ. gate charge

$$V_{GS}=f(Q_g); I_D=2A$$



### Typ. capacitances

$$C=f(V_{DS}); V_{GS}=0V; f=1MHz$$

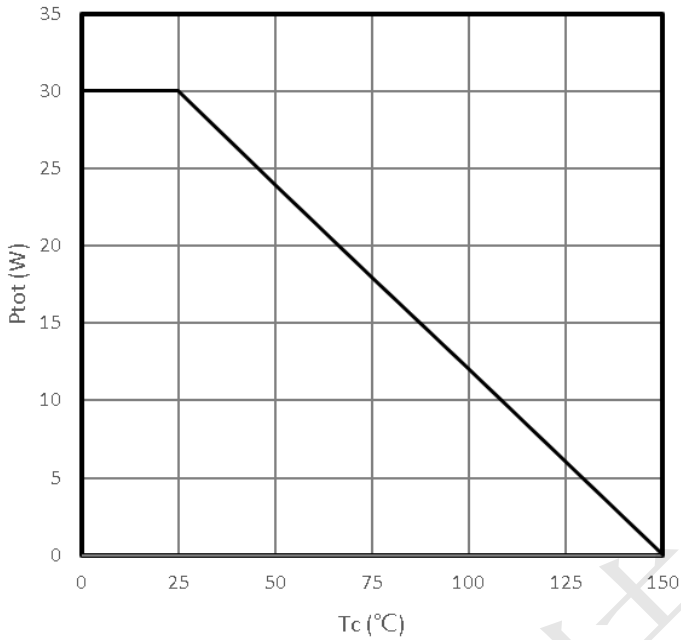




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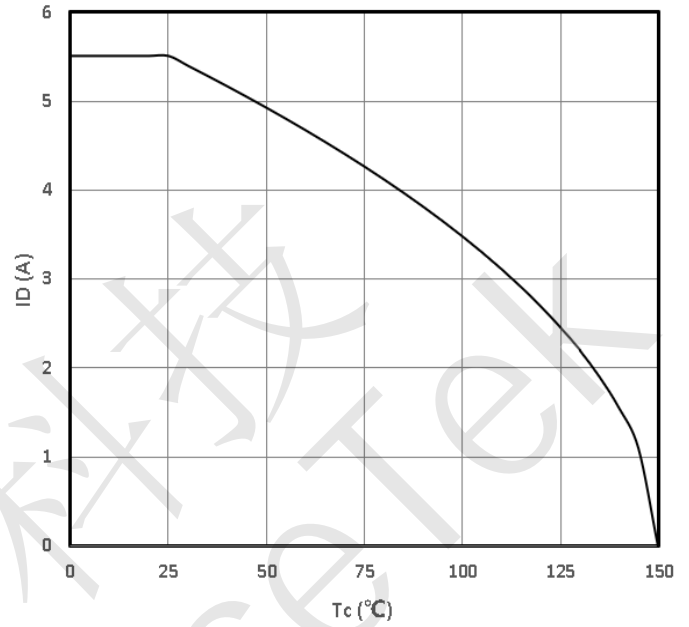
#### Power Dissipation

$$P_{tot}=f(T_c)$$



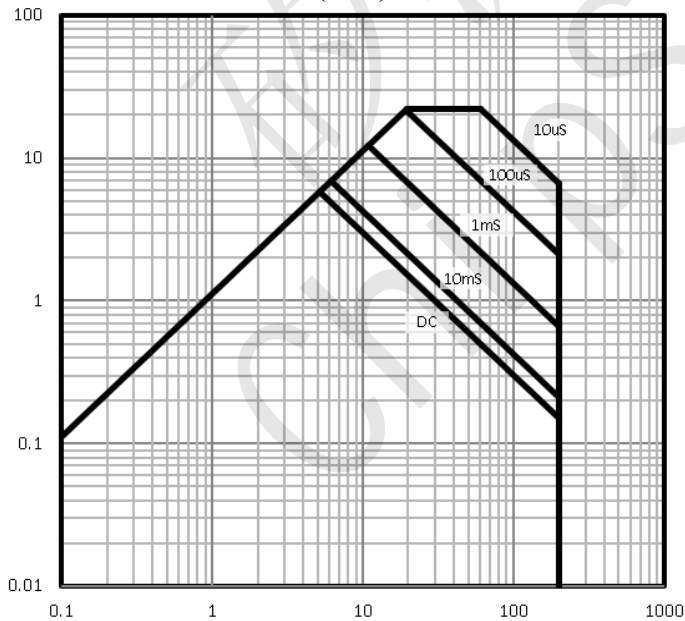
#### Maximum Drain Current

$$I_D=f(T_c)$$



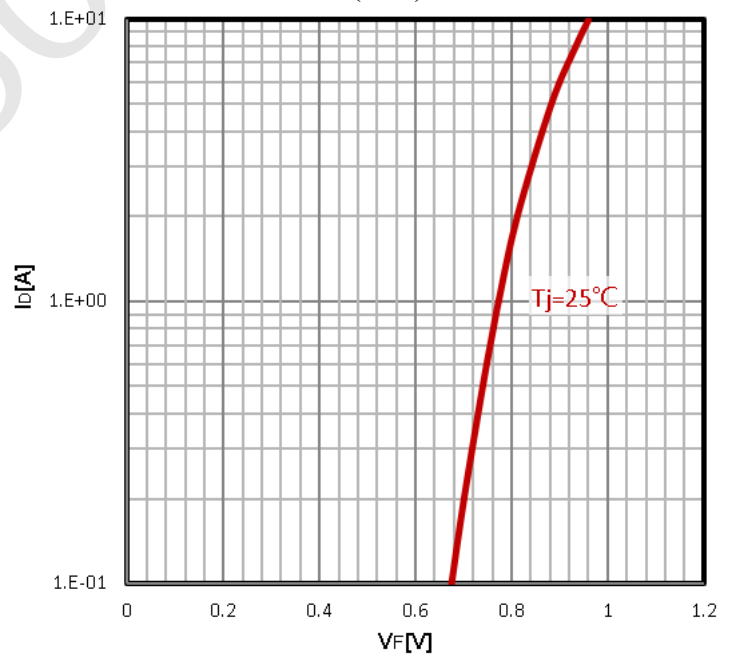
#### Safe operating area

$$I_D=f(V_{DS})$$



#### Body Diode Forward Voltage Variation

$$I_F=f(V_{GS})$$

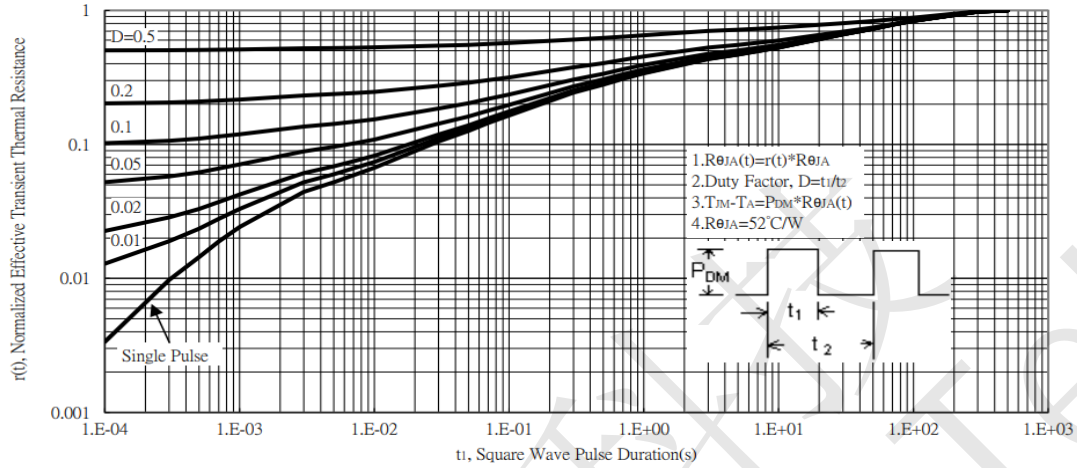




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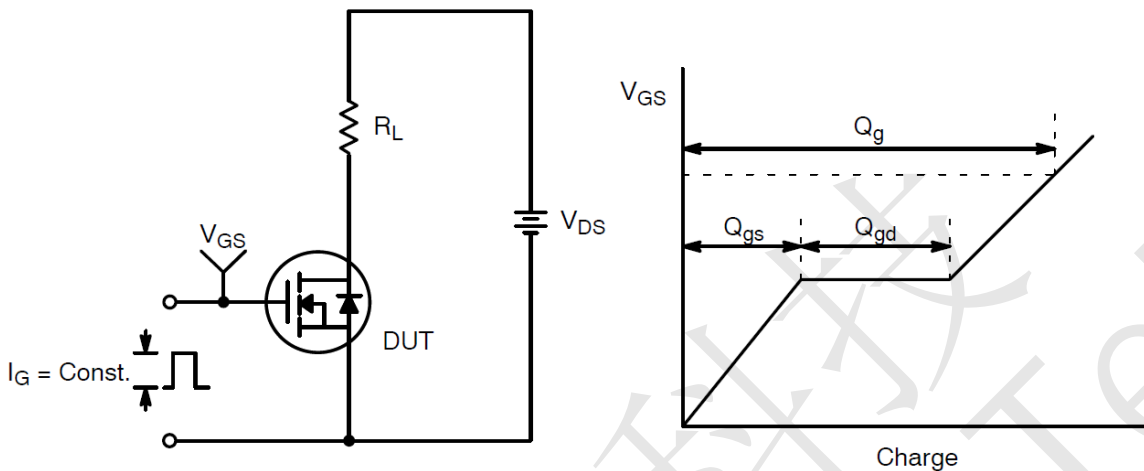
Max. transient thermal impedance

$$Z_{thJC}=f(t_p)$$

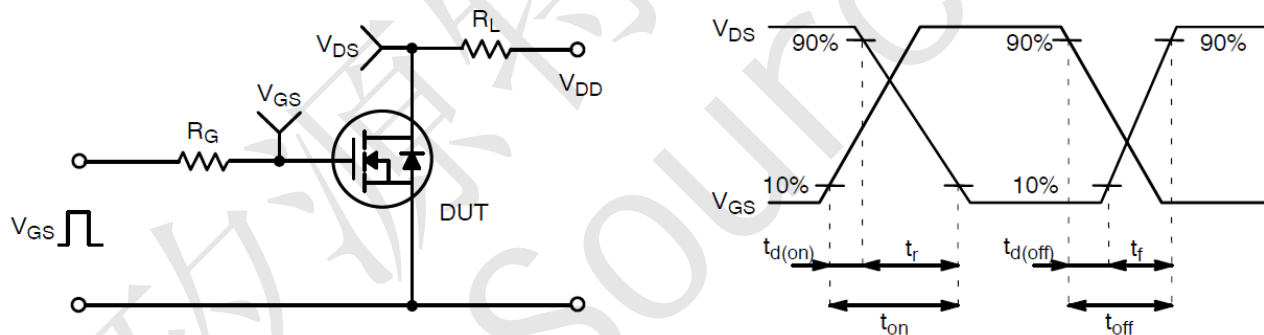




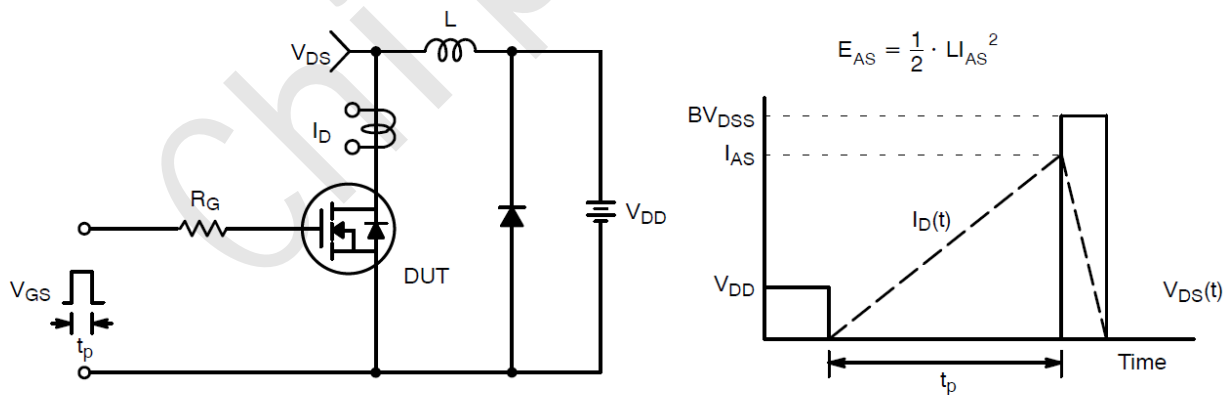
### CST5N20 Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

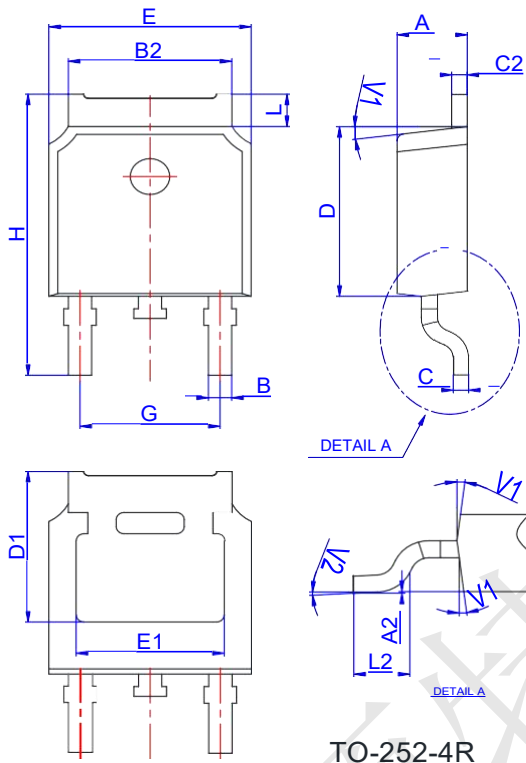


Unclamped Inductive Switching Test Circuit & Waveforms



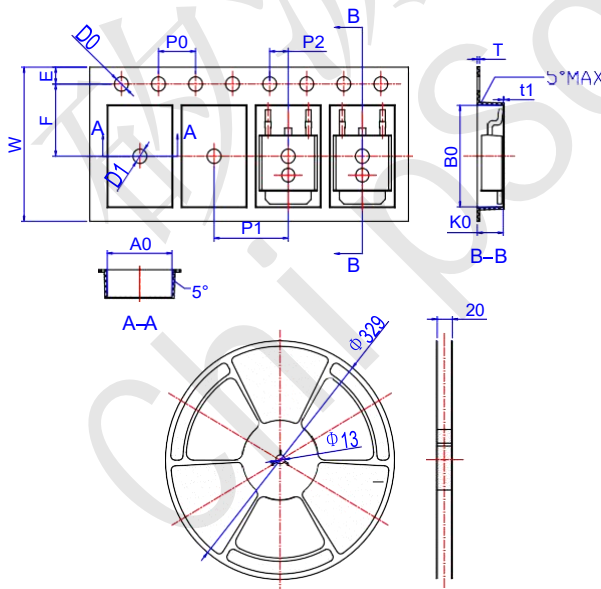
### CST5N20 N-Ch 200V Fast Switching MOSFETs

#### CST5N20 Package Mechanical Data-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

#### Reel Specification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583