



### CST70N10T N-Ch 100V Fast Switching MOSFETs



#### CST70N10T Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$

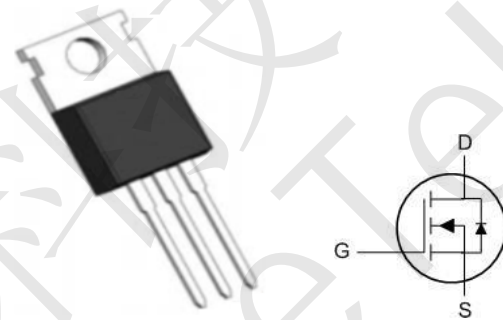
#### CST70N10T Product Summary

BVDSS	RDSON	ID
100V	8.5mΩ	70A

#### CST70N10T Applications

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

#### CST70N10T TO-220 Pin Configuration



#### CST70N10T Absolute Maximum Ratings:

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	100	V
$I_D$	Continuous Drain Current	70	A
	Continuous Drain Current	45	A
$I_{DM}^{a1}$	Pulsed Drain Current	280	A
$E_{AS}^{a2}$	Single pulse avalanche energy	110	mJ
$V_{GS}$	Gate-to-Source Voltage	±20	V
$P_D$	Power Dissipation	100	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
$T_L$	Maximum Temperature for Soldering	260	°C

#### CST70N10T Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.25	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	64	°C/W



### CST70N10T N-Ch 100V Fast Switching MOSFETs

**CST70N10T 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	100	--	--	V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> =100V, 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	1.3	1.8	2.3	V
R <sub>DS(ON)</sub>	Drain-to-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	--	8.5	10.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	--	9.5	15	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> = 50V f = 1.0MHz	--	1368	--	pF
C <sub>oss</sub>	Output Capacitance		--	451	--	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	12.9	--	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> Open	--	0.48	--	Ω

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> = 10A V <sub>DS</sub> = 50V V <sub>GS</sub> = 10V R <sub>G</sub> = 4Ω	--	16	--	ns
t <sub>r</sub>	Rise Time		--	10	--	
t <sub>d(OFF)</sub>	Turn-Off Delay Time		--	40	--	
t <sub>f</sub>	Fall Time		--	6	--	
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 10V	--	31.3	--	nC
Q <sub>gs</sub>	Gate Source Charge	V <sub>DS</sub> = 50V	--	3.49	--	
Q <sub>gd</sub>	Gate Drain Charge	I <sub>D</sub> = 10A	--	7.63	--	

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	--	--	70	A
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =10A, V <sub>GS</sub> =0V	--	--	1.2	V
t <sub>rr</sub>	Reverse Recovery time	I <sub>S</sub> =10A, V <sub>DD</sub> =50V dI/dt=100A/μs	--	103	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	187	--	nC

a1: Repetitive rating; pulse width limited by maximum junction temperature

a2: VDD=50V, L=0.3mH, Rg=25Ω, Starting T<sub>J</sub>=25 °C

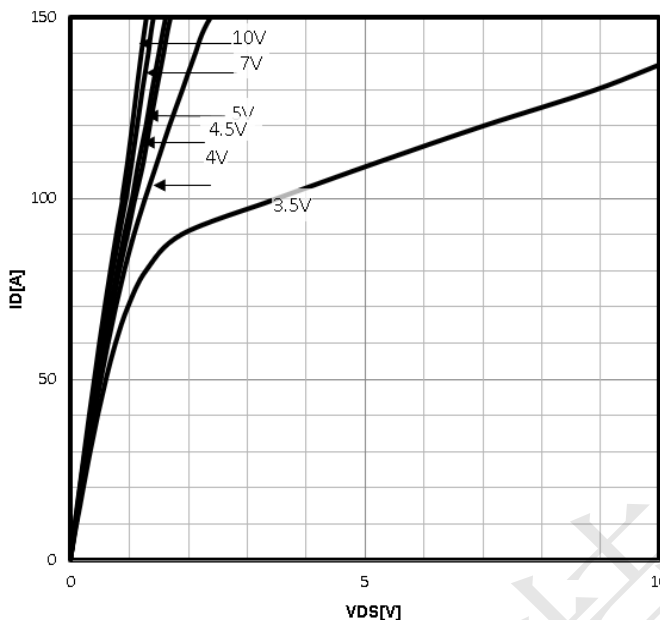


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### CST70N10T Characteristics Curve:

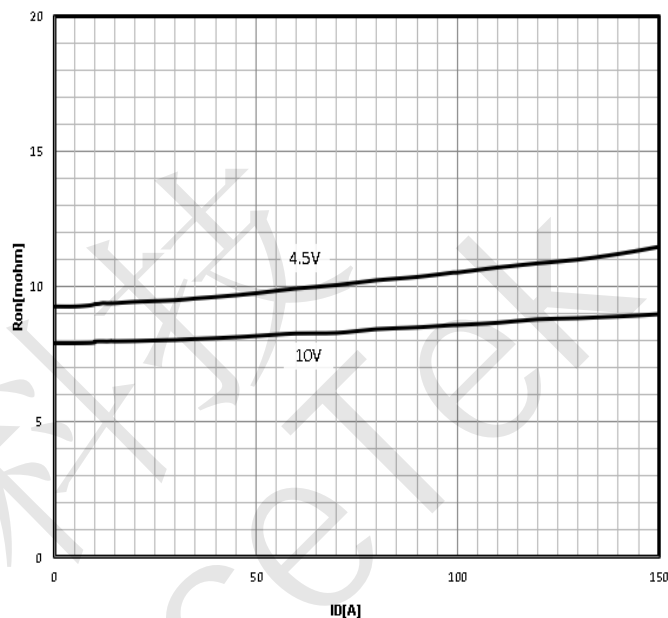
Typ. output characteristics

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



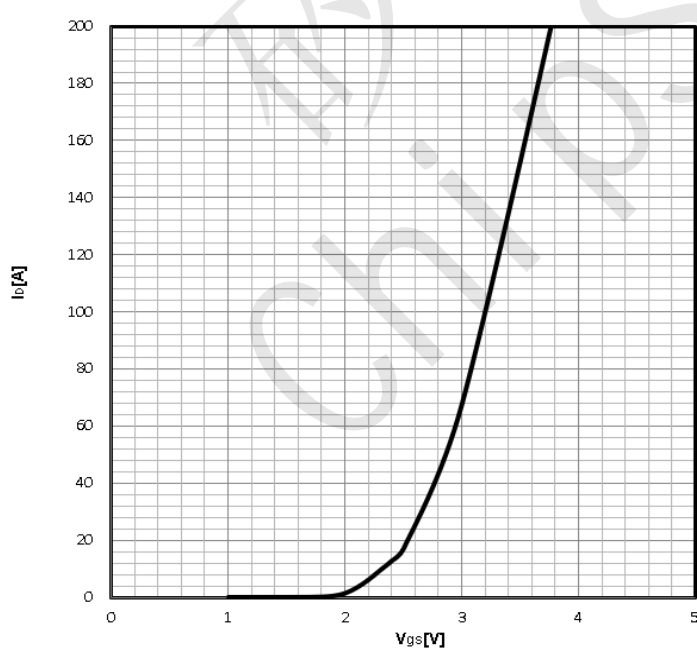
Typ. drain-source on resistance

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



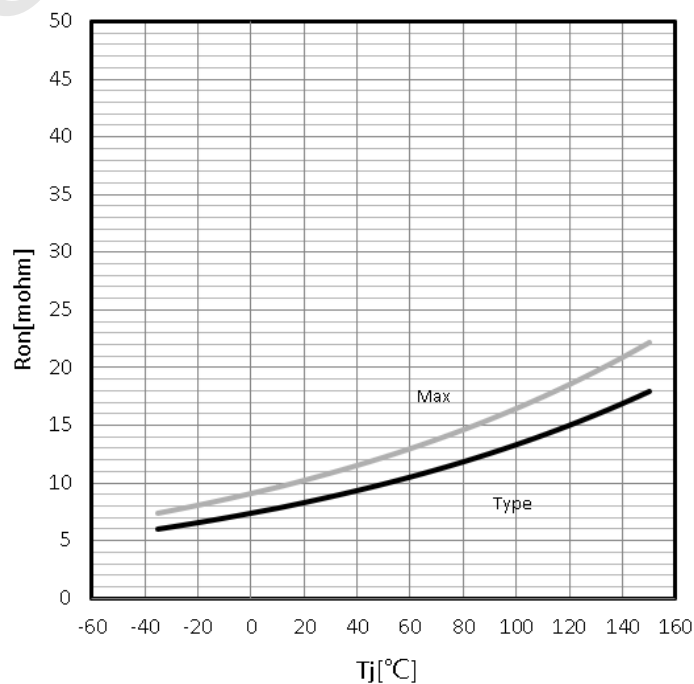
Typ. transfer characteristics

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



Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = 20A; V_{GS} = 10V$$

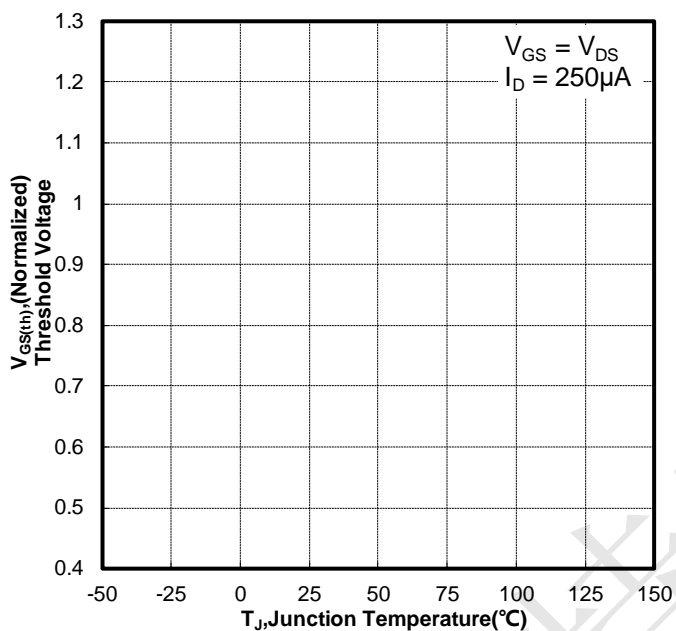




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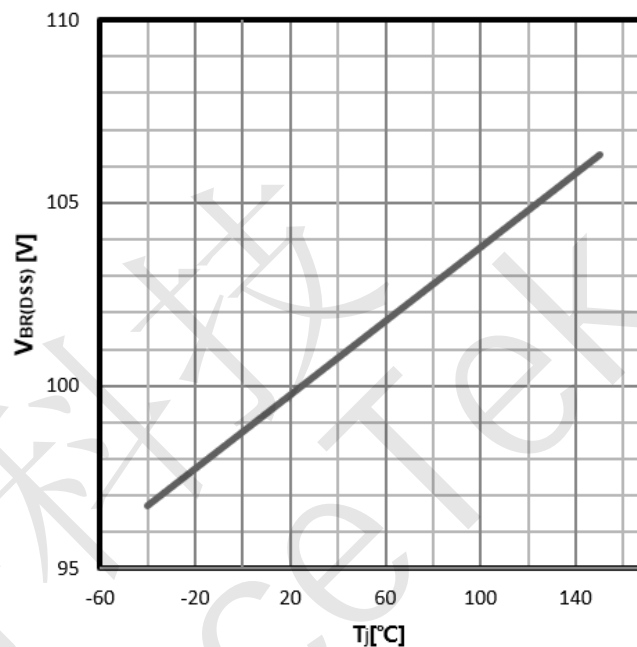
### Gate Threshold Voltage

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



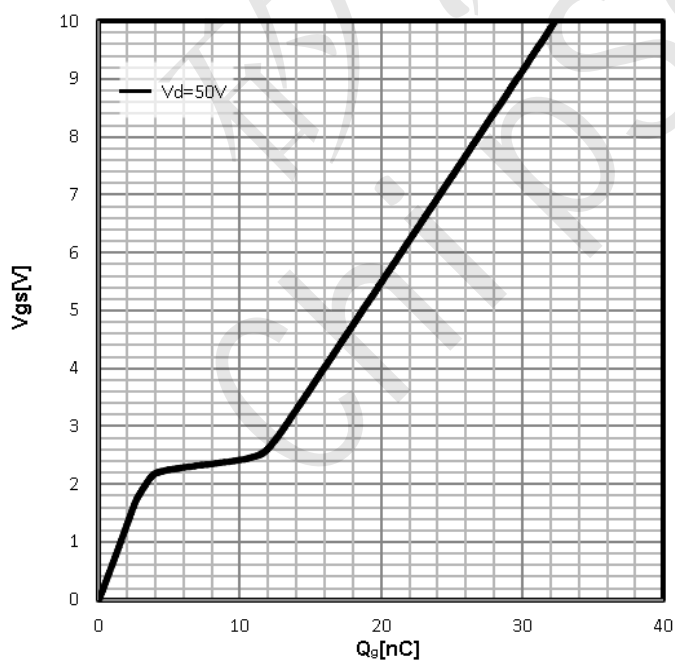
### Drain-source breakdown voltage

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



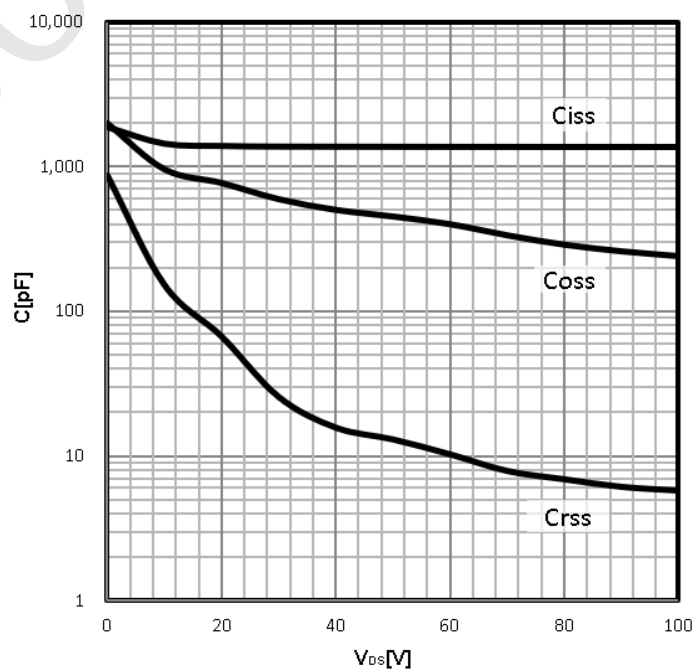
### Typ. gate charge

$$V_{GS}=f(Q_g); I_D=10A$$



### Typ. capacitances

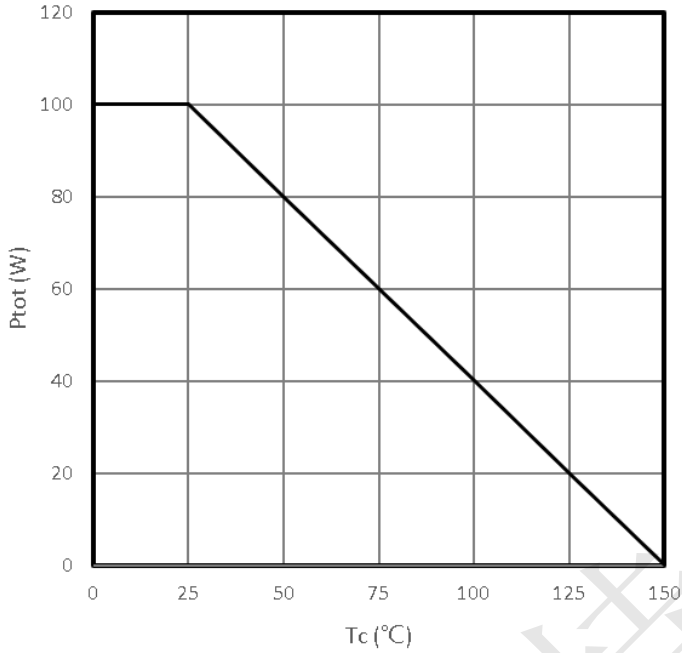
$$C=f(V_{DS}); V_{GS}=0V; f=1MHz$$



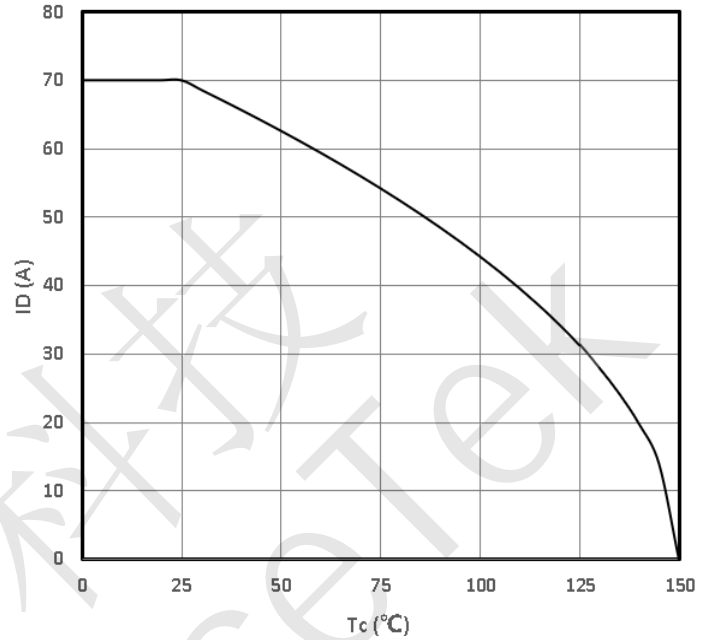


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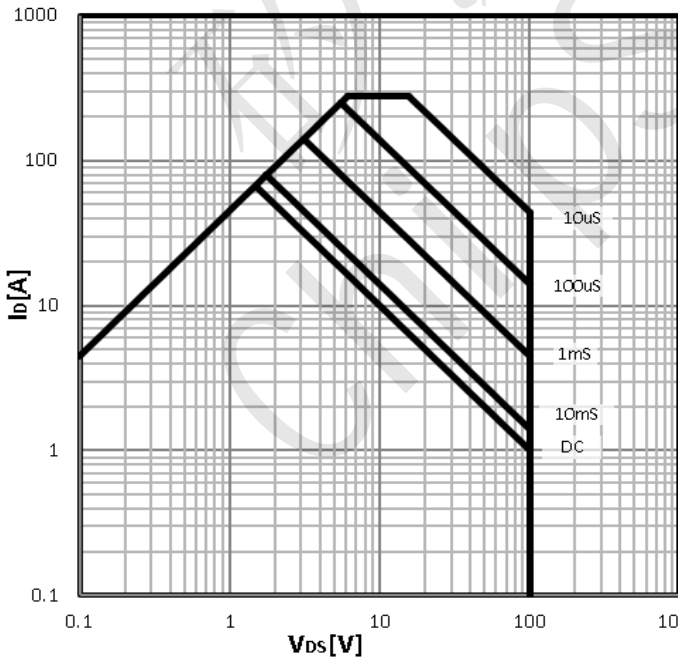
**Power Dissipation**  
 $P_{tot}=f(T_c)$



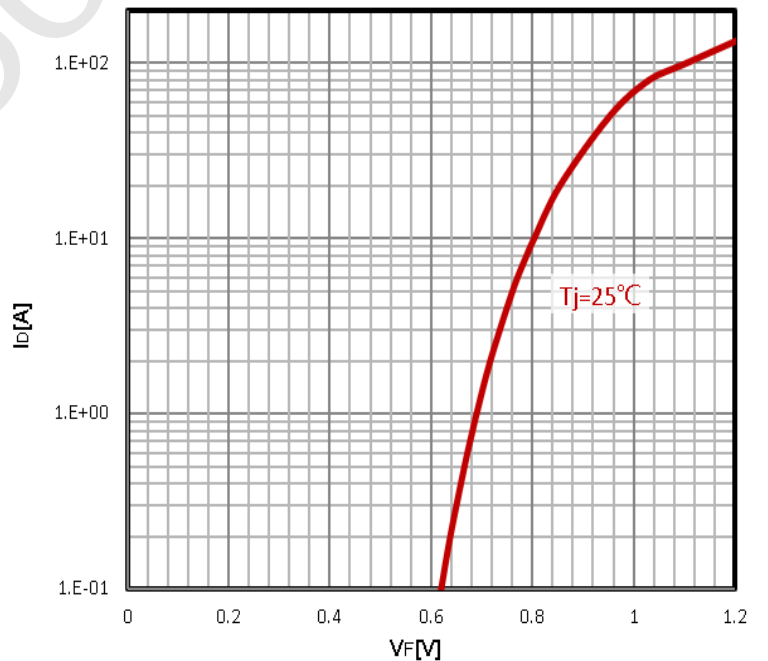
**Maximum Drain Current**  
 $I_D=f(T_c)$



**Safe operating area**  
 $I_D=f(V_{DS})$



**Body Diode Forward Voltage Variation**  
 $I_F=f(V_{GS})$

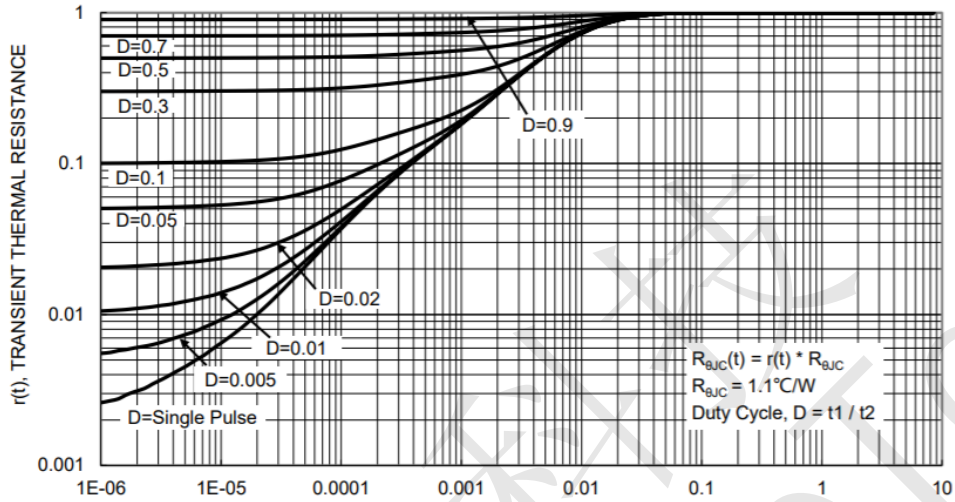




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Max. transient thermal impedance

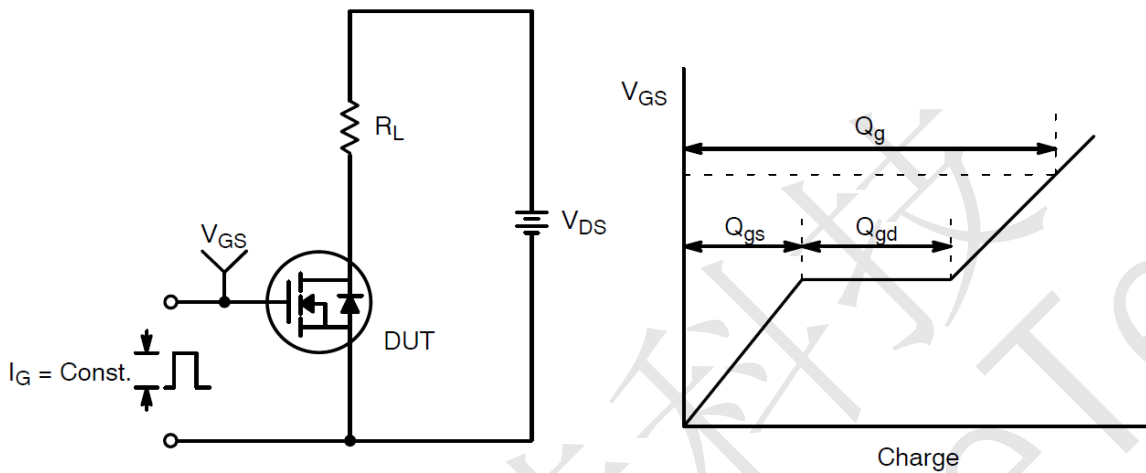
$$Z_{thJC} = f(t_p)$$



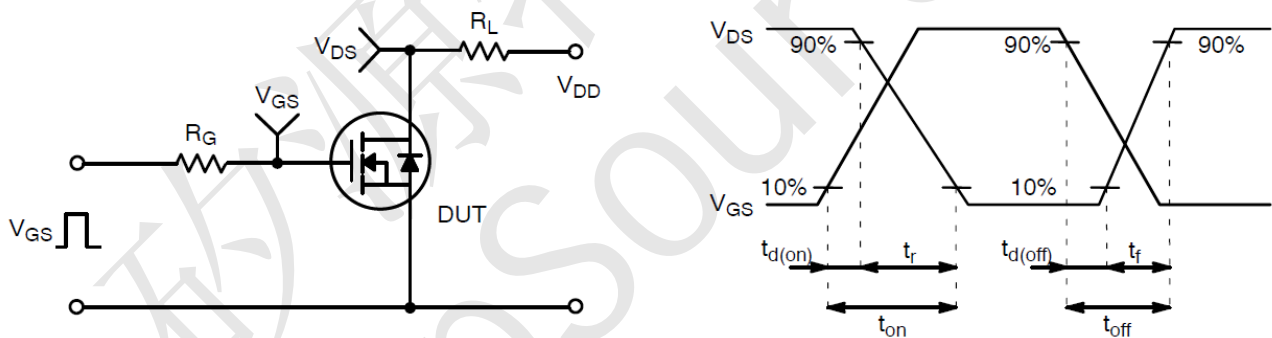


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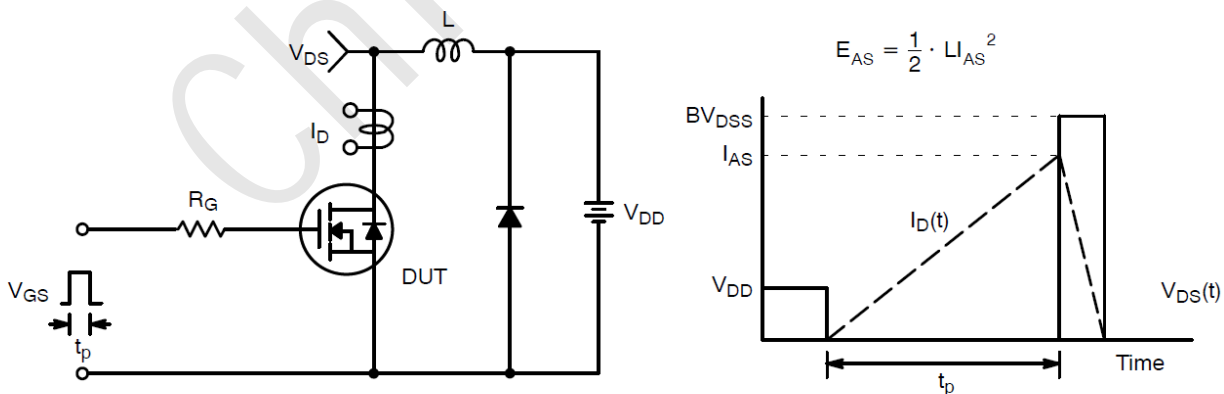
### CST70N10T Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



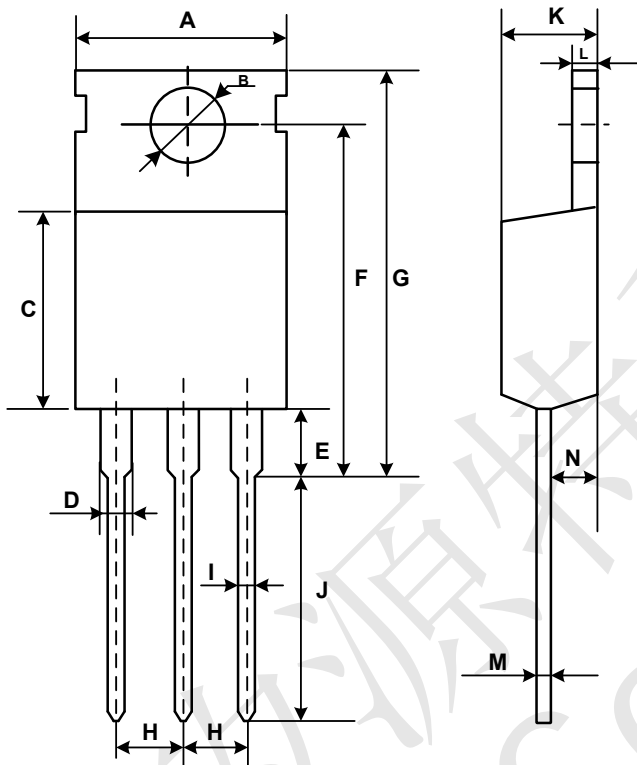
Unclamped Inductive Switching Test Circuit & Waveforms



CST70N10T N-Ch 100V Fast Switching MOSFETs

CST70N10T Mechanical Dimensions for TO-220

COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60