



### CST50N03Z N-Ch 30V Fast Switching MOSFETs

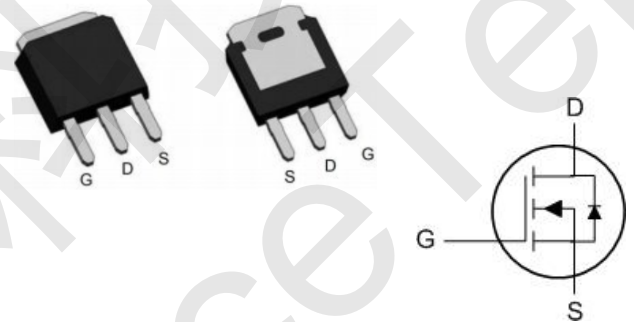
- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

#### CST50N03Z Product Summary



BVDSS	RDSON	ID
30V	7.6mΩ	50A

#### CST50N03Z TO251 Pin Configuration



#### CST50N03Z Description

The CST50N03Z is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The CST50N03Z meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

#### CST50N03Z Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		10s	Steady State	
$V_{DS}$	Drain-Source Voltage	30		V
$V_{GS}$	Gate-Source Voltage	±20		V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	50		A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	26		A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	168		A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	33		mJ
$I_{AS}$	Avalanche Current	23.8		A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation <sup>4</sup>	30.5		W
$T_{STG}$	Storage Temperature Range	-55 to 175		°C
$T_J$	Operating Junction Temperature Range	-55 to 175		°C

#### CST50N03Z Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	5.26	°C/W



### CST50N03Z N-Ch 30V Fast Switching MOSFETs

#### CST50N03Z Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,	-	-	1.0	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance note3	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	7.6	10	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	11.5	17	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1.0MHz	-	1011	-	pF
C <sub>oss</sub>	Output Capacitance		-	142	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	119	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	19	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	6.3	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	4.5	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =30V, I <sub>D</sub> =2A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V	-	6	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	5	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	25	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	7	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	50	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	160	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =30A	-	-	1.2	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =30A, di/dt=100A/μs	-	7	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	6.3	-	nC

- Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature  
 2. EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=11.5A  
 3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%



### CST50N03Z Typical Performance Characteristics

Figure 1: Output Characteristics

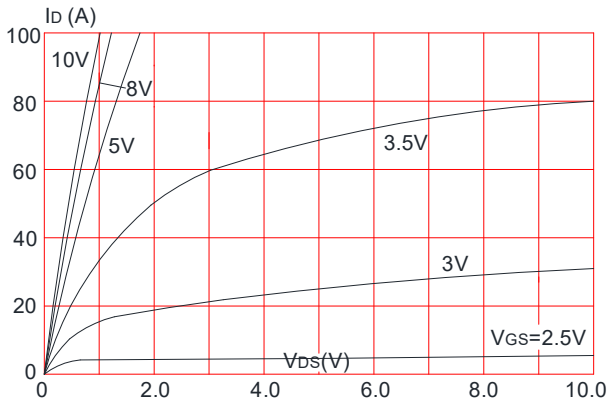


Figure 2: Typical Transfer Characteristics

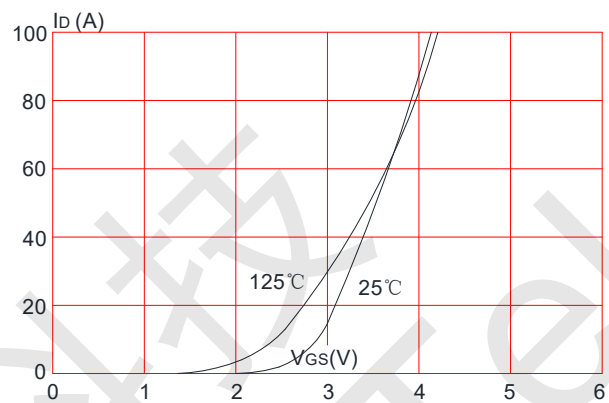


Figure 3: On-resistance vs. Drain Current

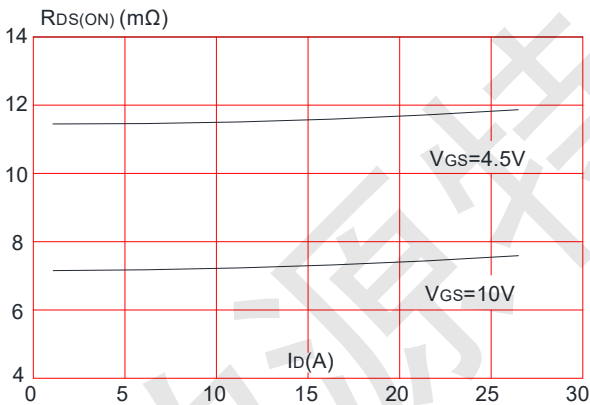


Figure 4: Body Diode Characteristics

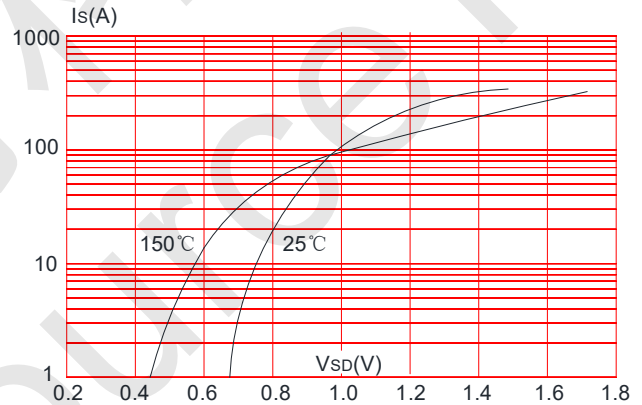


Figure 5: Gate Charge Characteristics

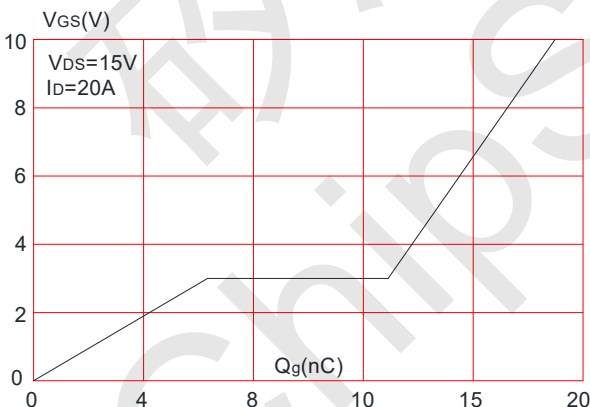
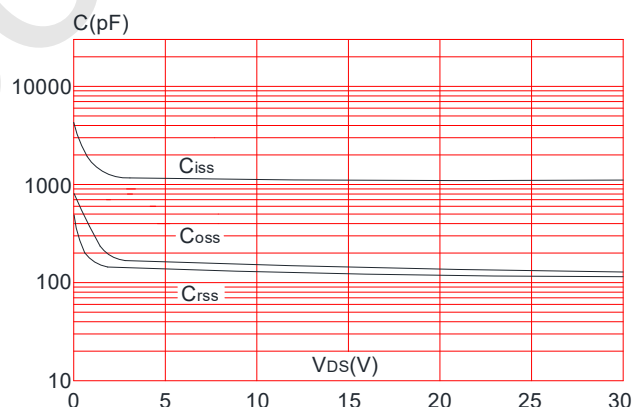


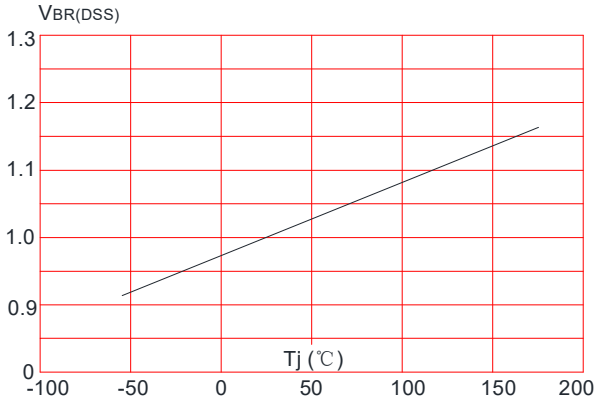
Figure 6: Capacitance Characteristics



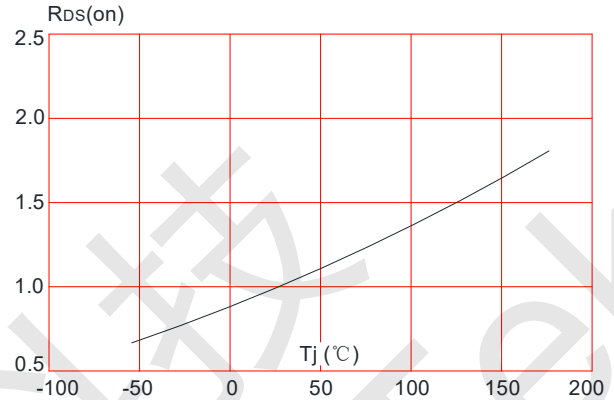


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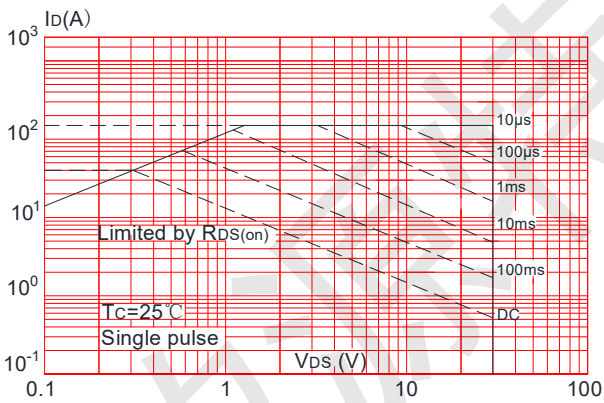
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



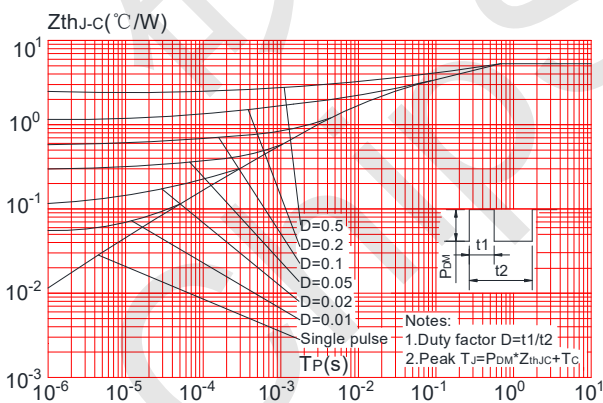
**Figure 8:** Normalized on Resistance vs. Junction Temperature



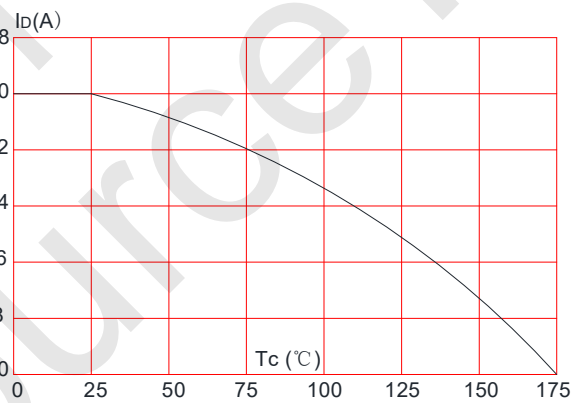
**Figure 9:** Maximum Safe Operating Area



Maximum Effective Transient Thermal Impedance, Junction-to-Case



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature





CST50N03Z Test Circuit

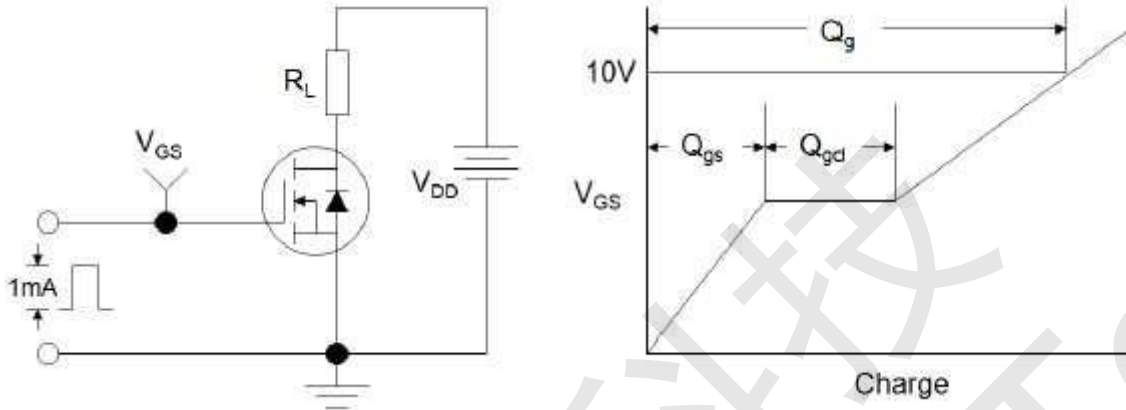


Figure1:Gate Charge Test Circuit & Waveform

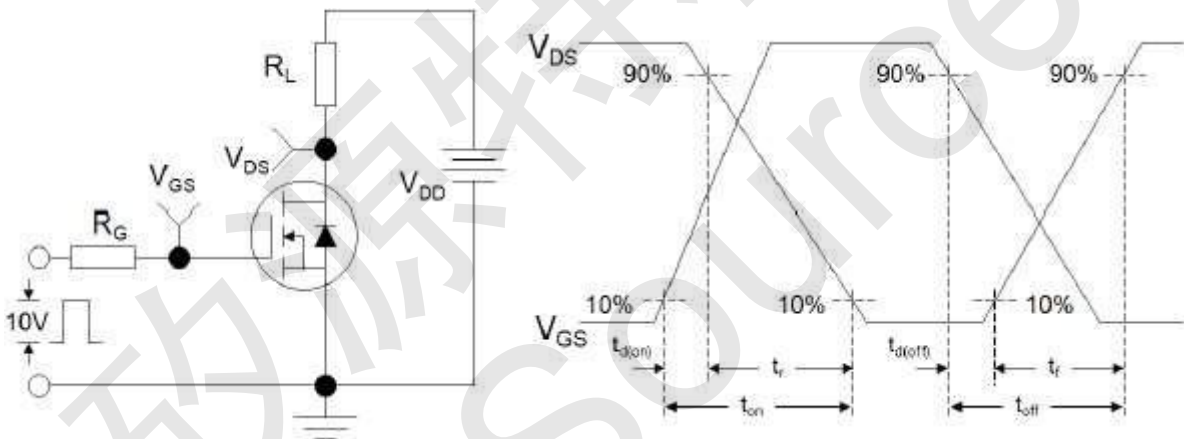


Figure 2: Resistive Switching Test Circuit & Waveforms

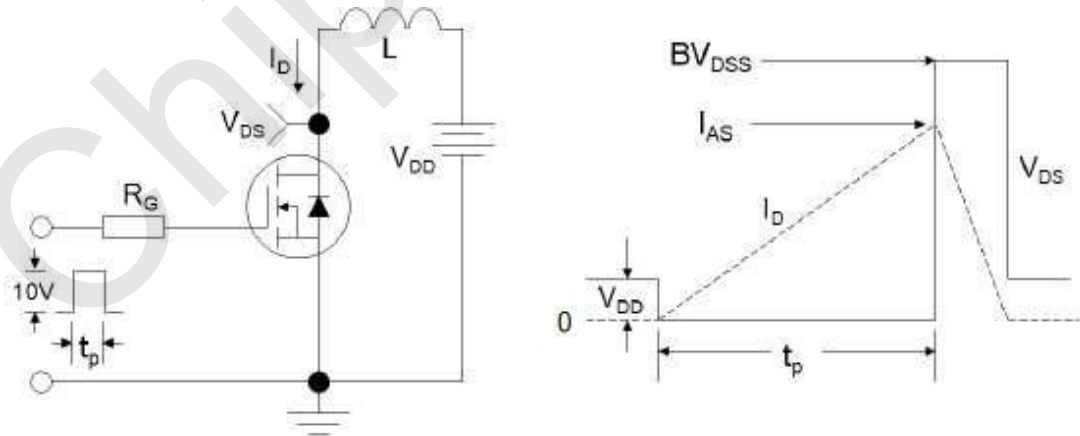


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



CST50N03Z Package Mechanical Data TO-251

