



### CST15N120 N-Ch 100V Fast Switching MOSFETs

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

#### CST15V12 Product Summary



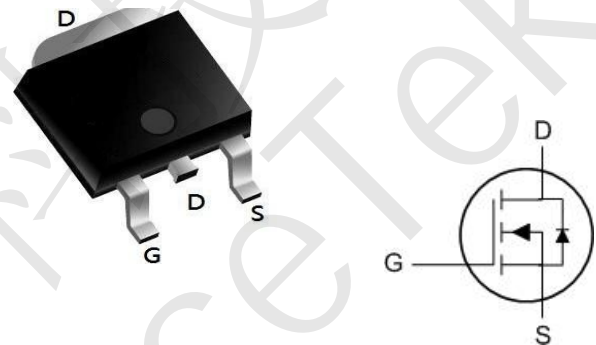
BVDSS	RDSON	ID
120V	120 mΩ	15A

#### CST15N12 Description

The CST15N12 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The CST15N12 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

#### CST15N12 TO252 Pin Configuration



#### CST15N12 Absolute Maximum Ratings (T<sub>c</sub>=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	120	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	T <sub>c</sub> =25°C	15
		T <sub>c</sub> =100°C	9.2
Pulsed Drain Current <sup>1</sup>	I <sub>DM</sub>	58	A
Single Pulse Avalanche Energy <sup>2</sup>	EAS	20	mJ
Total Power Dissipation	P <sub>D</sub>	66	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

#### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient <sup>3</sup>	R <sub>θJA</sub>	30	°C/W
Thermal Resistance from Junction-to-Case	R <sub>θJC</sub>	1.9	°C/W



#### CST15N12 Electrical Characteristics ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	120	-	-	V
Gate-body Leakage current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$T_J = 25^\circ\text{C}$	$I_{DSS}$ $V_{DS} = 120V, V_{GS} = 0V$	-	-	1	$\mu A$
	$T_J = 100^\circ\text{C}$		-	-	100	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	2	3	V
Drain-Source On-Resistance <sup>4</sup>	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 10A$	-	120	160	m $\Omega$
		$V_{GS} = 4.5V, I_D = 6A$	-	125	170	
Forward Transconductance <sup>4</sup>	$g_{fs}$	$V_{DS} = 10V, I_D = 10A$	-	14.5	-	S
<b>Dynamic Characteristics<sup>5</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 60V,$ $f = 1MHz$	-	1076	-	pF
Output Capacitance	$C_{oss}$		-	27	-	
Reverse Transfer Capacitance	$C_{rss}$		-	20	-	
Gate Resistance	$R_g$	$f = 1MHz$	-	1.1	-	$\Omega$
<b>Switching Characteristics<sup>5</sup></b>						
Total Gate Charge	$Q_g$	$V_{GS} = 10V, V_{DS} = 60V,$ $I_D = 10A$	-	23	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.5	-	
Gate-Drain Charge	$Q_{gd}$		-	5	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DD} = 60V,$ $R_G = 3\Omega, I_D = 10A$	-	10.8	-	ns
Rise Time	$t_r$		-	5.2	-	
Turn-Off Delay Time	$t_{d(off)}$		-	32.6	-	
Fall Time	$t_f$		-	5.8	-	
<b>Drain-Source Body Diode Characteristics</b>						
Diode Forward Voltage <sup>4</sup>	$V_{SD}$	$I_S = 10A, V_{GS} = 0V$	-	-	1.2	V
Continuous Source Current	$T_C = 25^\circ\text{C}$	$I_S$	-	-	15	A

#### Notes:

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ\text{C}$ .
2. The EAS data shows Max. rating . The test condition is  $V_{DD} = 25V, V_{GS} = 10V, L = 0.4mH, I_{AS} = 10A$ .
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
5. This value is guaranteed by design hence it is not included in the production test.



### CST15N12 Typical Characteristics

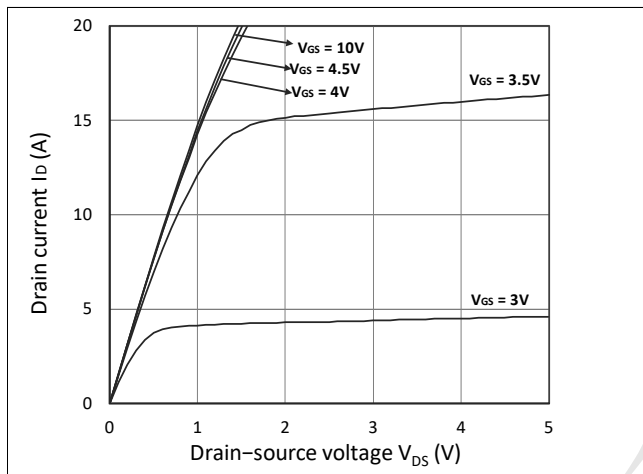


Figure 1. Output Characteristics

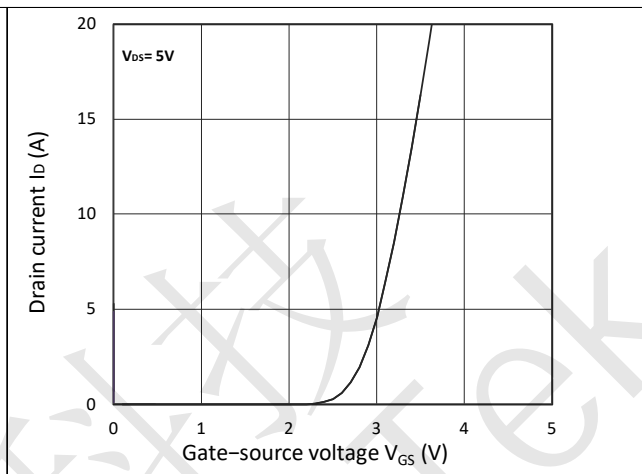


Figure 2. Transfer Characteristics

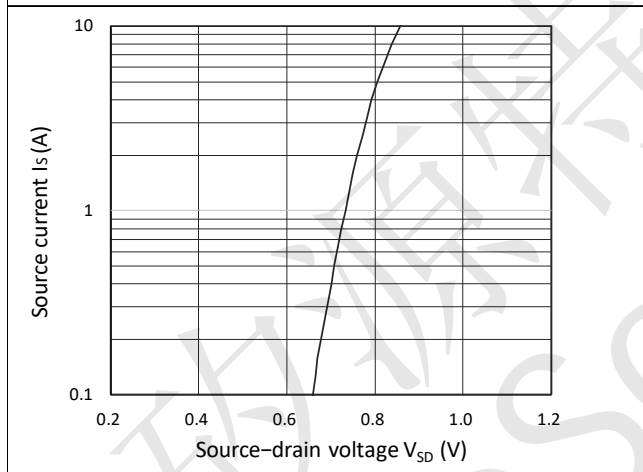


Figure 3. Forward Characteristics of Reverse

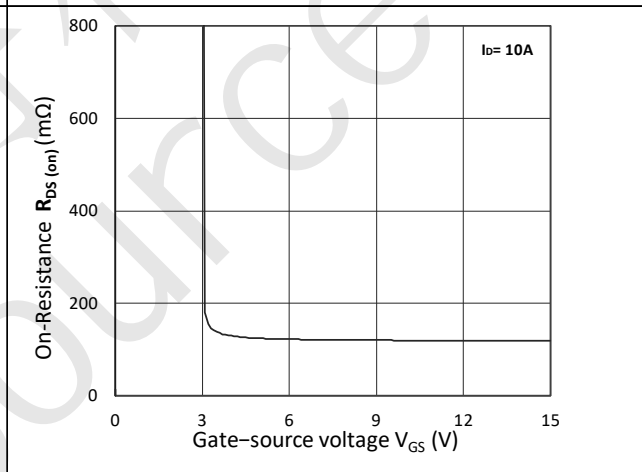


Figure 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

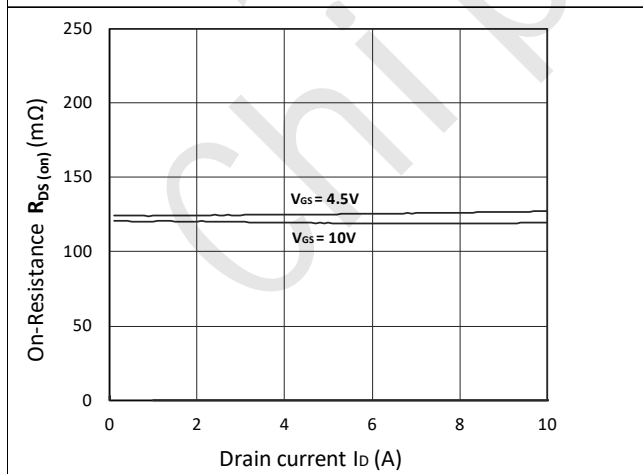


Figure 5.  $R_{DS(ON)}$  vs.  $I_D$

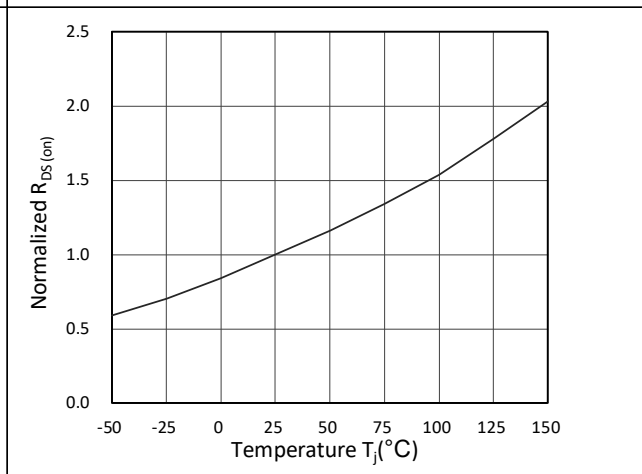


Figure 6. Normalized  $R_{DS(ON)}$  vs. Temperature



### CST15N120 N-Ch 100V Fast Switching MOSFETs

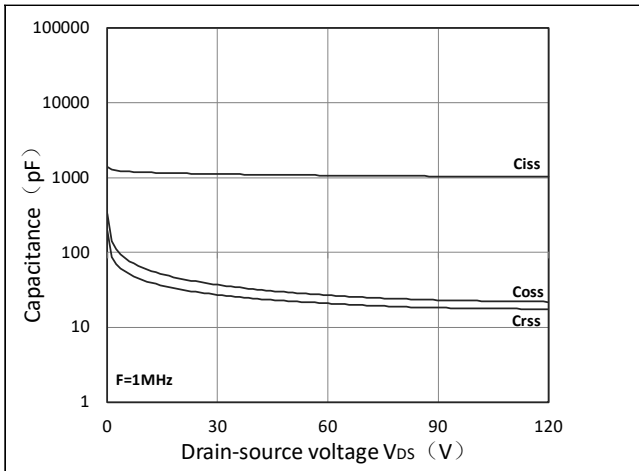


Figure 7. Capacitance Characteristics

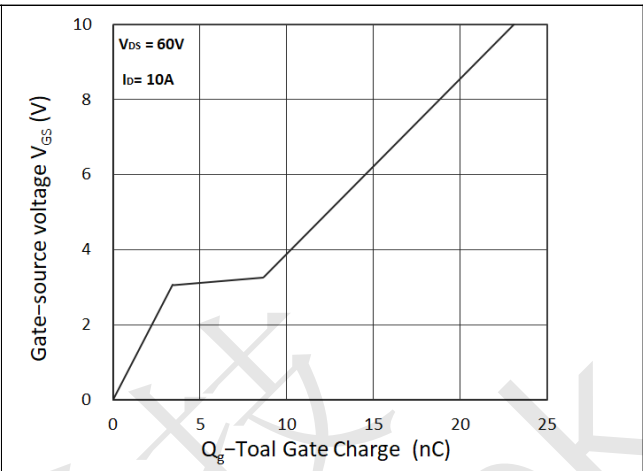


Figure 8. Gate Charge Characteristics

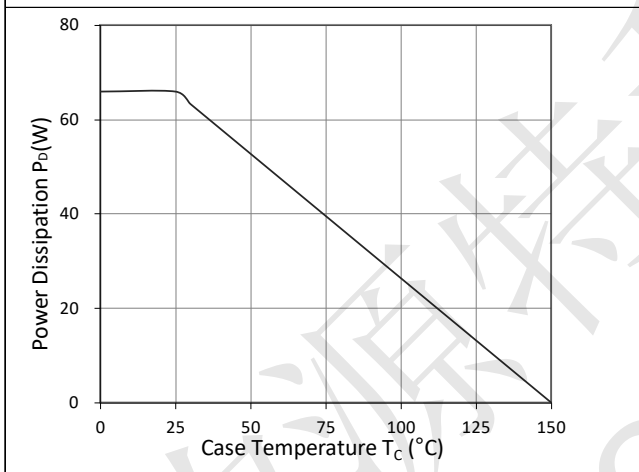


Figure 9. Power Dissipation

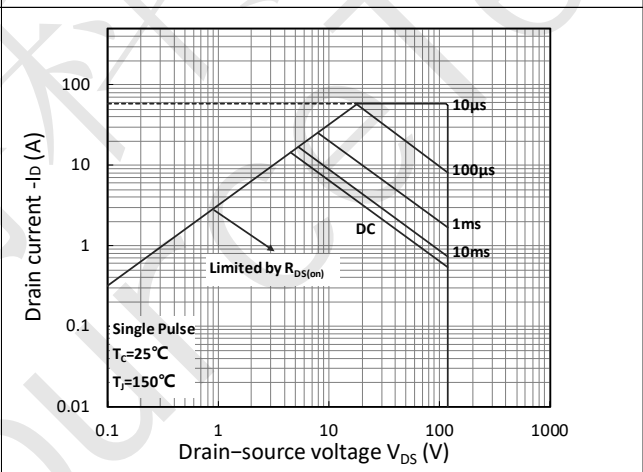


Figure 10. Safe Operating Area

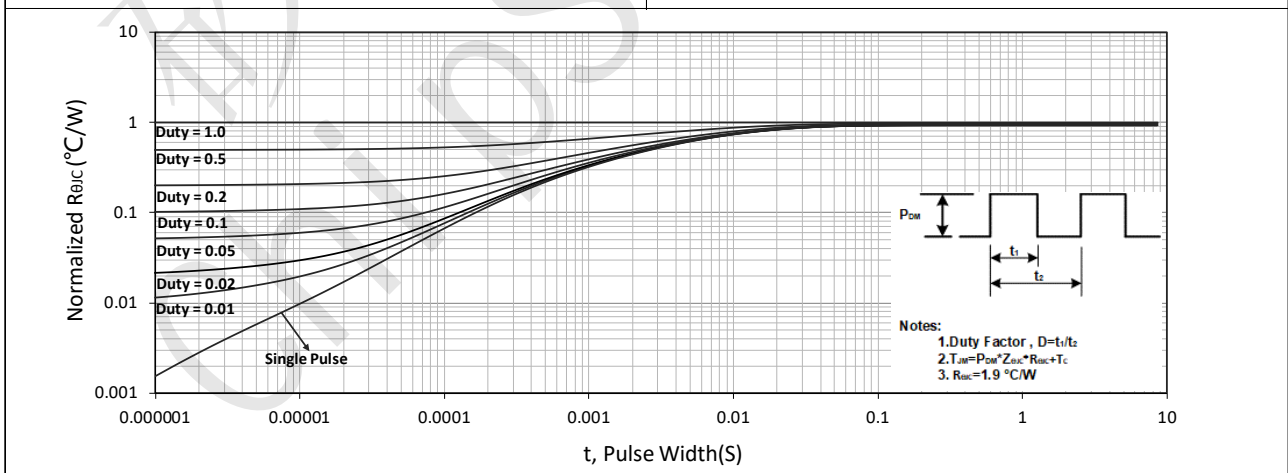


Figure 11. Normalized Maximum Transient Thermal Impedance



### CST15N12 Test Circuit

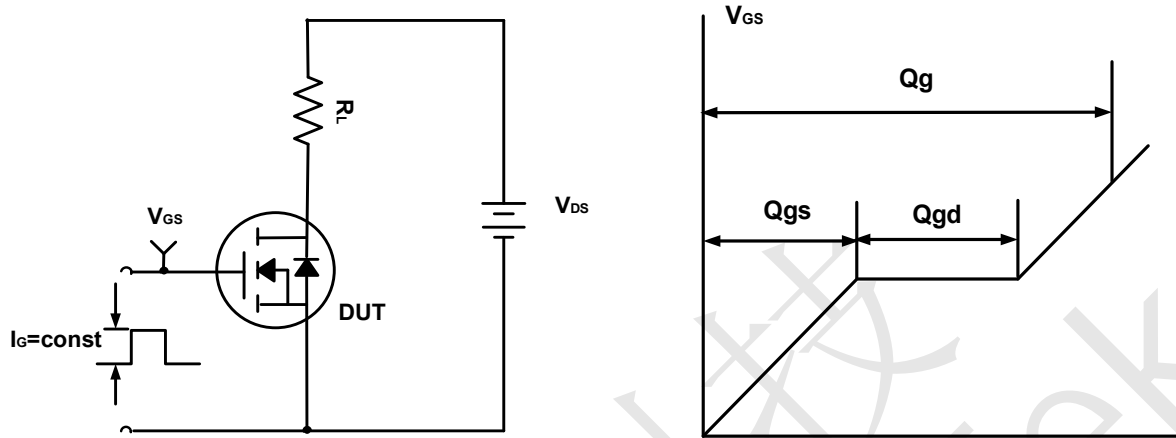


Figure A. Gate Charge Test Circuit & Waveforms

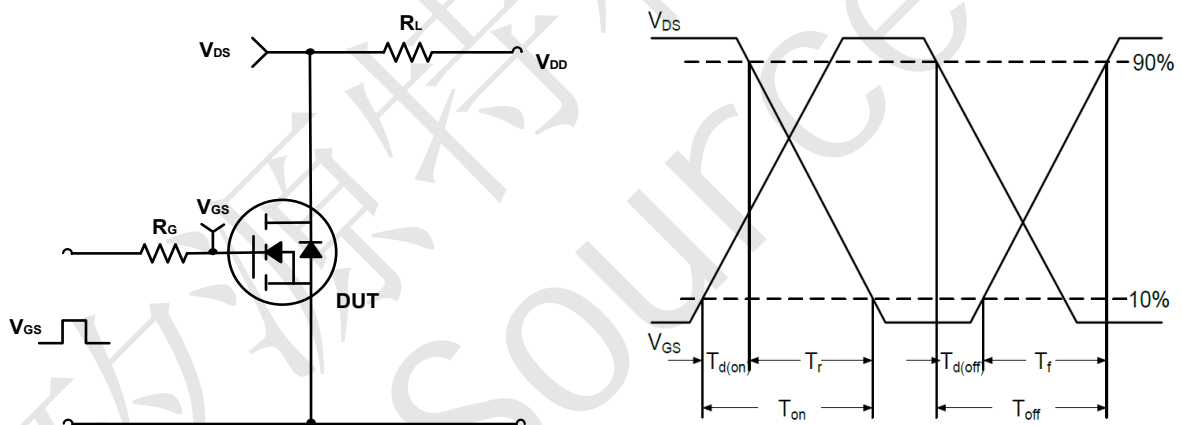


Figure B. Switching Test Circuit & Waveforms

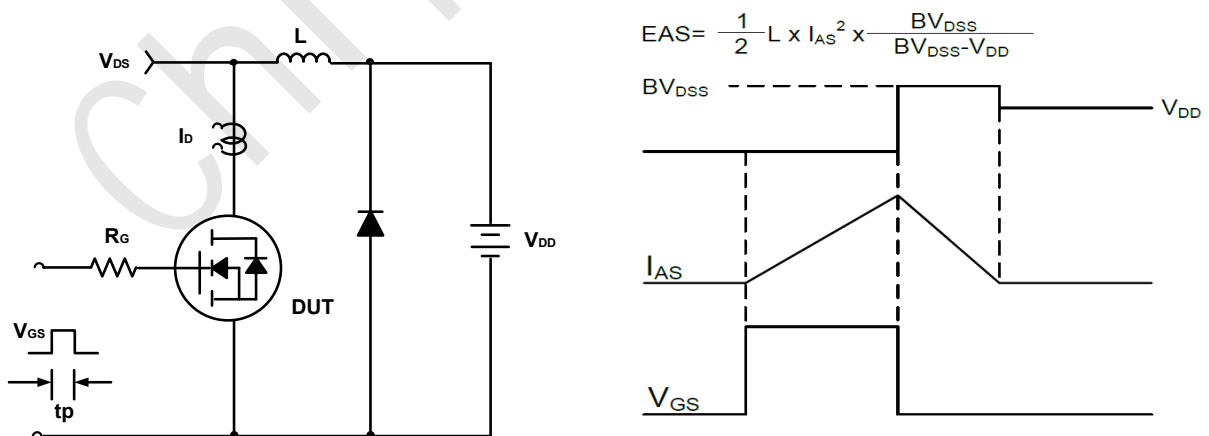
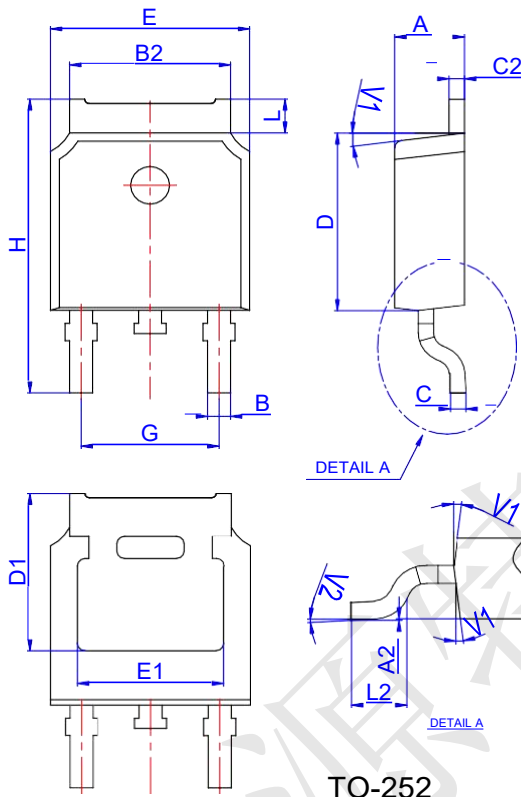


Figure C. Unclamped Inductive Switching Circuit & Waveforms

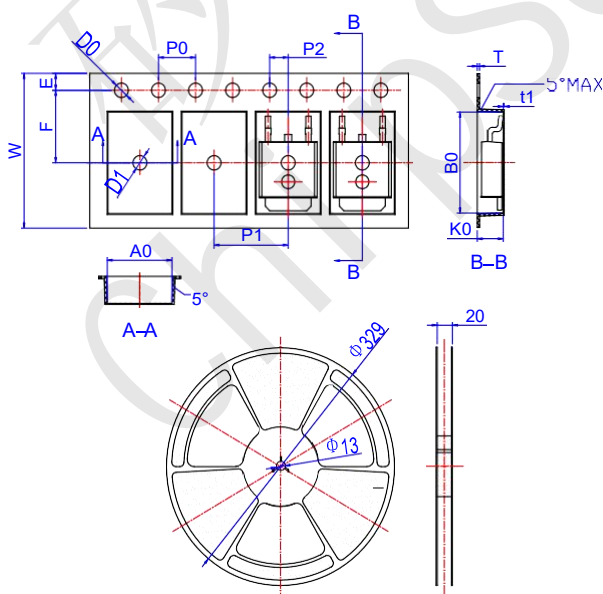


#### CST15N12 Package Mechanical Data TO-252



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-252-4R



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