



### CSTS150N10G N-Ch 100V Fast Switching MOSFETs

#### CSTS150N10G Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low RDS(ON)

#### CSTS150N10G Product Summary

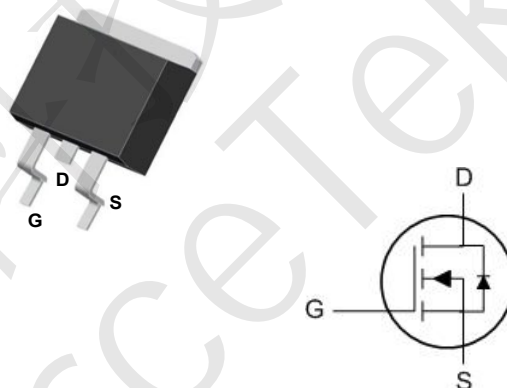


BVDSS	RDSON	ID
100V	3.1 mΩ	150A

#### CSTS150N10G Applications

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

#### CSTS150N10G TO\* Pin Configuration



#### CSTS150N10G Absolute Maximum Ratings (@ T<sub>A</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DS</sub>	100	V
Gate-to-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current <sup>(1)</sup>	I <sub>D</sub>	T <sub>C</sub> = 25°C	150
		T <sub>C</sub> = 100°C	96
Pulsed Drain Current <sup>(2)</sup>	I <sub>DM</sub>	619	A
Avalanche Energy <sup>(3)</sup>	E <sub>AS</sub>	726	mJ
Power Dissipation <sup>(4)</sup>	P <sub>D</sub>	T <sub>C</sub> = 25°C	312
		T <sub>C</sub> = 100°C	125
Junction & Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C



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#### CSTS150N10G Electrical Characteristics (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$	100			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80\text{V}$ , $V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			1.0 5.0	$\mu\text{A}$
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{V}$ , $V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	2.0	3.0	4.0	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$ , $I_D = 20\text{A}$		3.1	3.6	$\text{m}\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{V}$ , $I_D = 20\text{A}$		50		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1\text{A}$ , $V_{GS} = 0\text{V}$		0.66	1.0	V
Diode Continuous Current	$I_S$	$T_C = 25^\circ\text{C}$			150	A
<b>DYNAMIC PARAMETERS <sup>(5)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{V}$ , $V_{DS} = 50\text{V}$ , $f = 1\text{MHz}$		4797		pF
Output Capacitance	$C_{oss}$			900		pF
Reverse Transfer Capacitance	$C_{rss}$			19.1		pF
Gate Resistance	$R_g$	$V_{GS} = 0\text{V}$ , $V_{DS} = 0\text{V}$ , $f = 1\text{MHz}$		1.9		$\Omega$
<b>SWITCHING PARAMETERS <sup>(5)</sup></b>						
Total Gate Charge (@ $V_{GS} = 10\text{V}$ )	$Q_g$	$V_{GS} = 0$ to $10\text{V}$ $V_{DS} = 50\text{V}$ , $I_D = 20\text{A}$		84		nC
Total Gate Charge (@ $V_{GS} = 6.0\text{V}$ )	$Q_g$			57		nC
Gate Source Charge	$Q_{gs}$			24		nC
Gate Drain Charge	$Q_{gd}$			27		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS} = 10\text{V}$ , $V_{DS} = 50\text{V}$ $R_L = 2.5\Omega$ , $R_{GEN} = 3\Omega$		21		ns
Turn-On Rise Time	$t_r$			35		ns
Turn-Off DelayTime	$t_{D(off)}$			49		ns
Turn-Off Fall Time	$t_f$			30		ns
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 20\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$		71		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F = 20\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$		127		nC

#### Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	45	55	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.40	0.60	$^\circ\text{C}/\text{W}$

#### Notes:

1. Computed continuous current assumes the condition of  $T_{J\_Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under  $T_{J\_Max} = 150^\circ\text{C}$ .
3.  $E_{AS}$  of 726 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 22\text{A}$ ,  $V_{GS} = 10\text{V}$ ,  $V_{DD} = 50\text{V}$ ; 100% test at  $L = 0.3\text{mH}$ ,  $I_{AS} = 45\text{A}$ ,  $T_{J\_Max} = 150^\circ\text{C}$ .
4. The power dissipation  $P_D$  is based on  $T_{J\_Max} = 150^\circ\text{C}$ .
5. This value is guaranteed by design hence it is not included in the production test.



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#### CSTS150N10G Typical Electrical & Thermal Characteristics

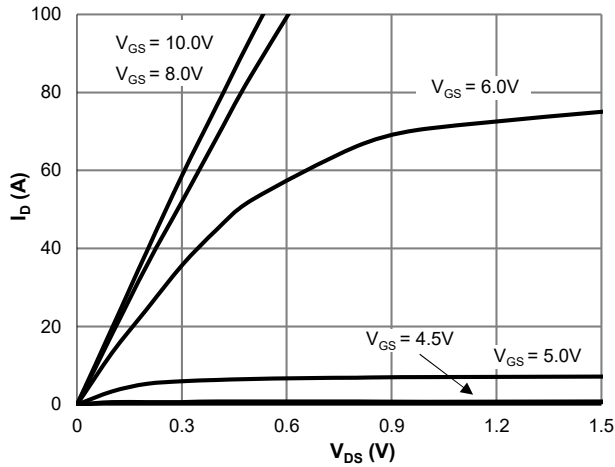


Figure 1: Saturation Characteristics

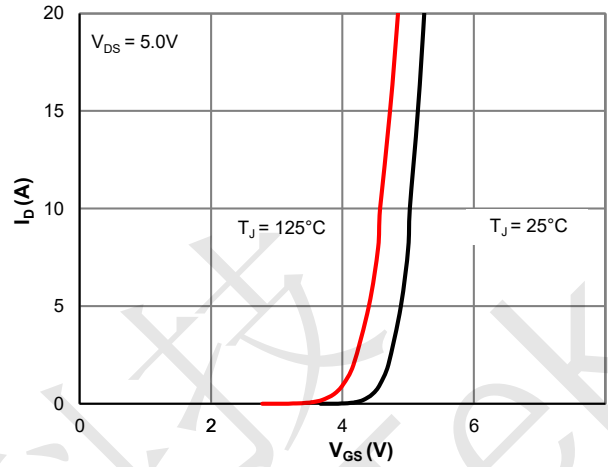


Figure 2: Transfer Characteristics

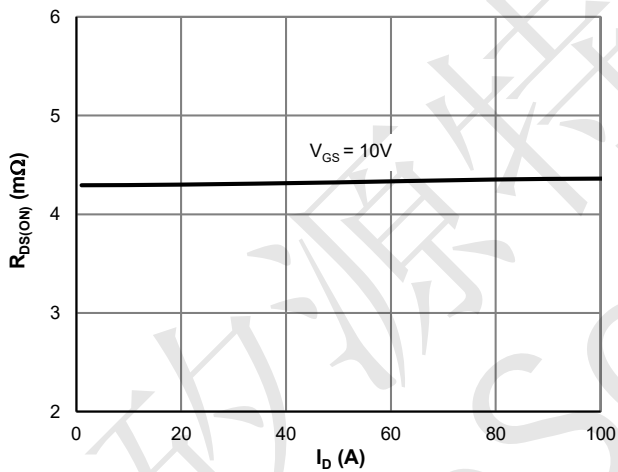


Figure 3:  $R_{DS(ON)}$  vs. Drain Current

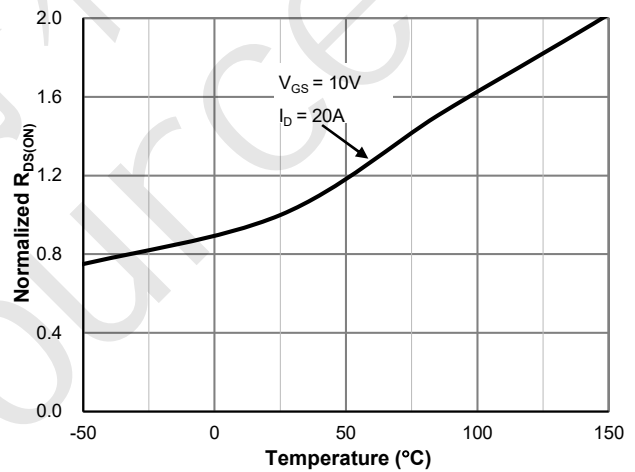


Figure 4:  $R_{DS(ON)}$  vs. Junction Temperature

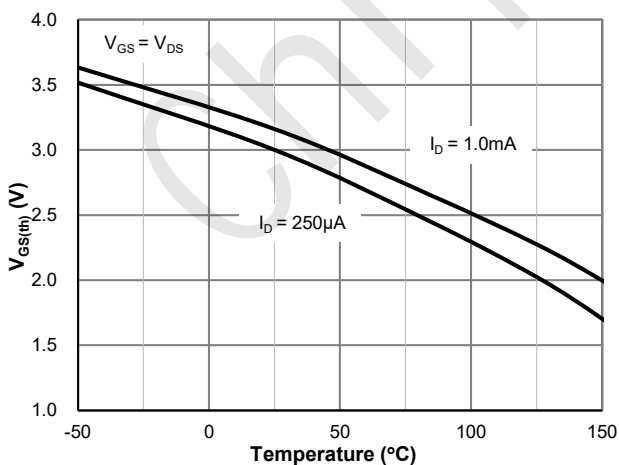


Figure 5:  $V_{GS(th)}$  vs. Junction Temperature

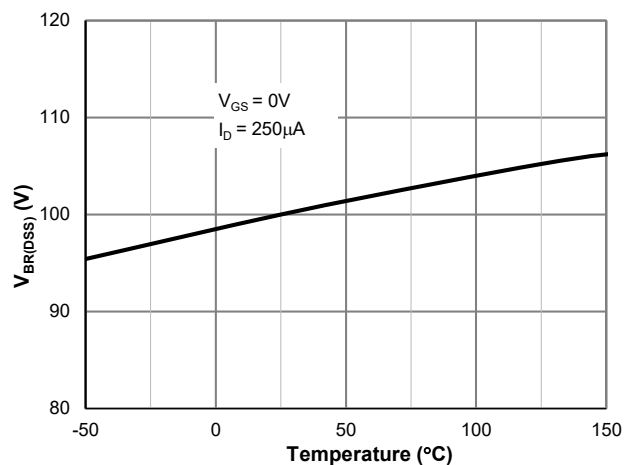


Figure 6:  $V_{BR(DSS)}$  vs. Junction Temperature



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#### CSTS150N10G Typical Electrical & Thermal Characteristics

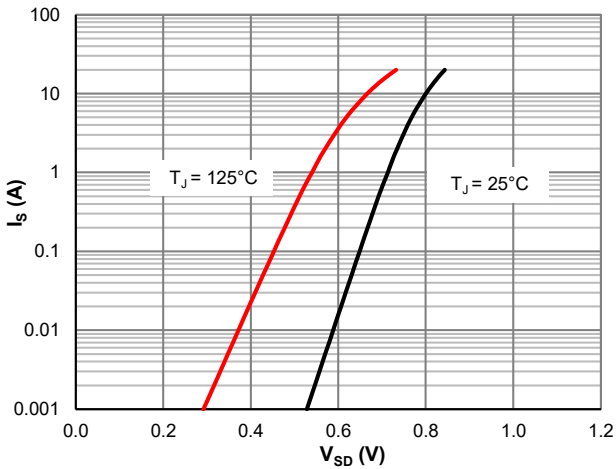


Figure 7: Body-Diode Characteristics

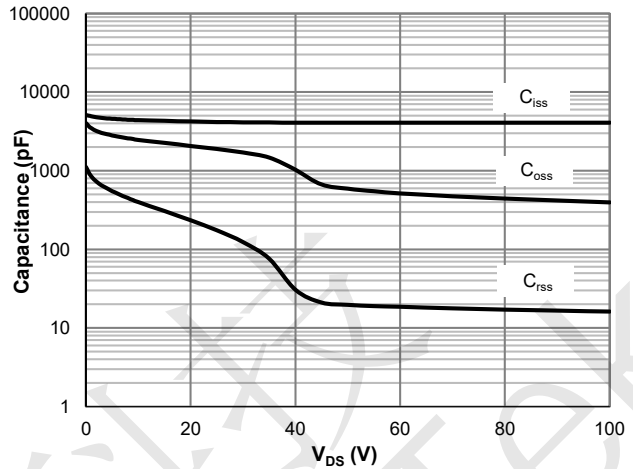


Figure 8: Capacitance Characteristics

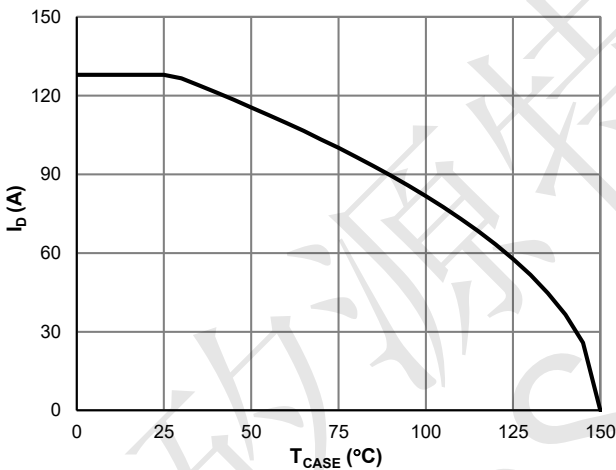


Figure 9: Current De-rating

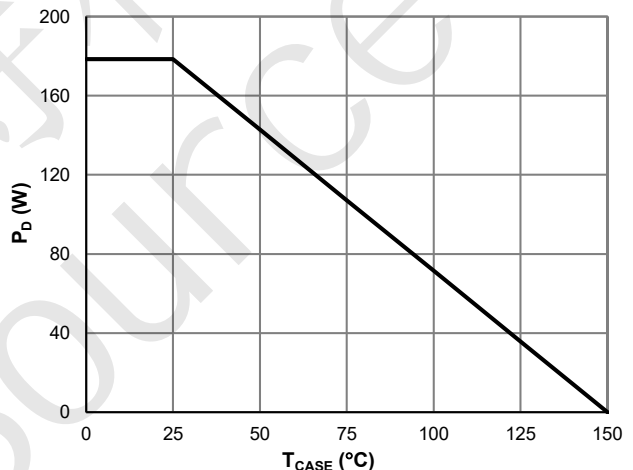


Figure 10: Power De-rating

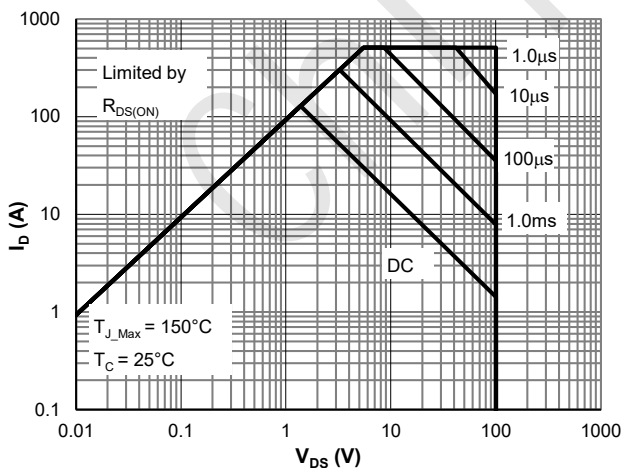


Figure 11: Maximum Safe Operating Area

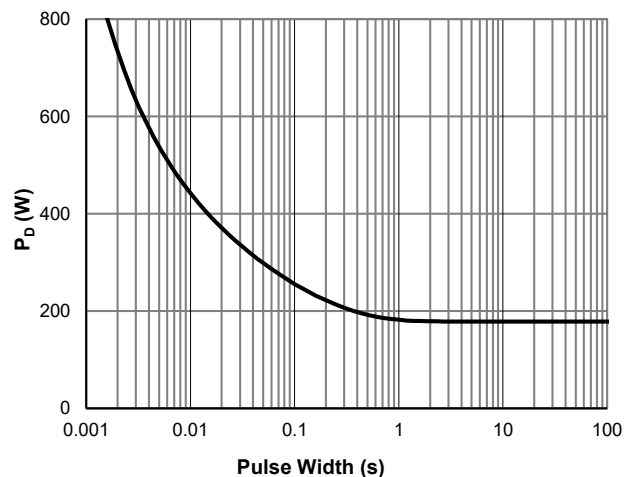


Figure 12: Single Pulse Power Rating, Junction-to-Case



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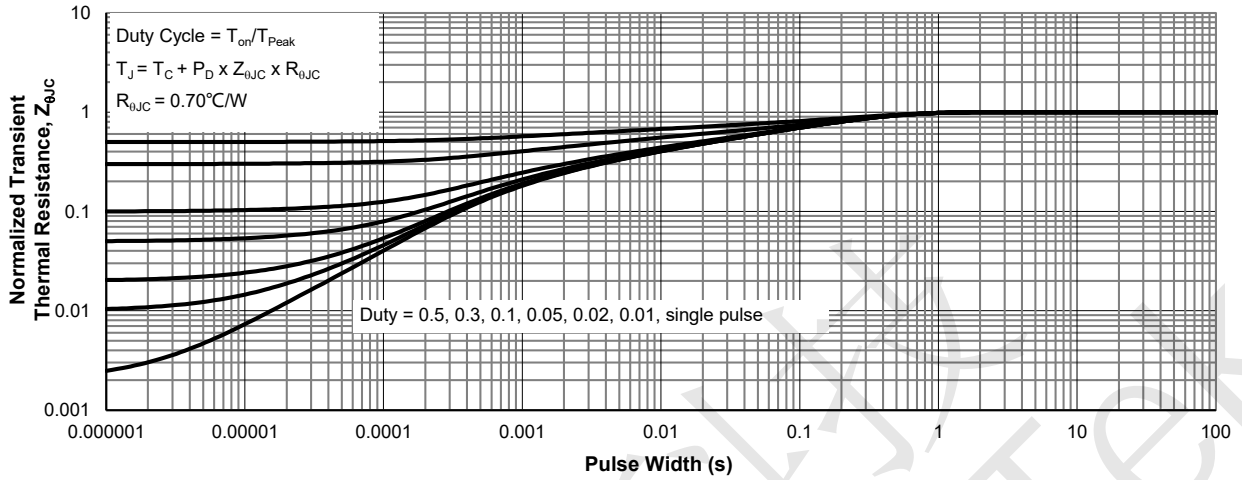
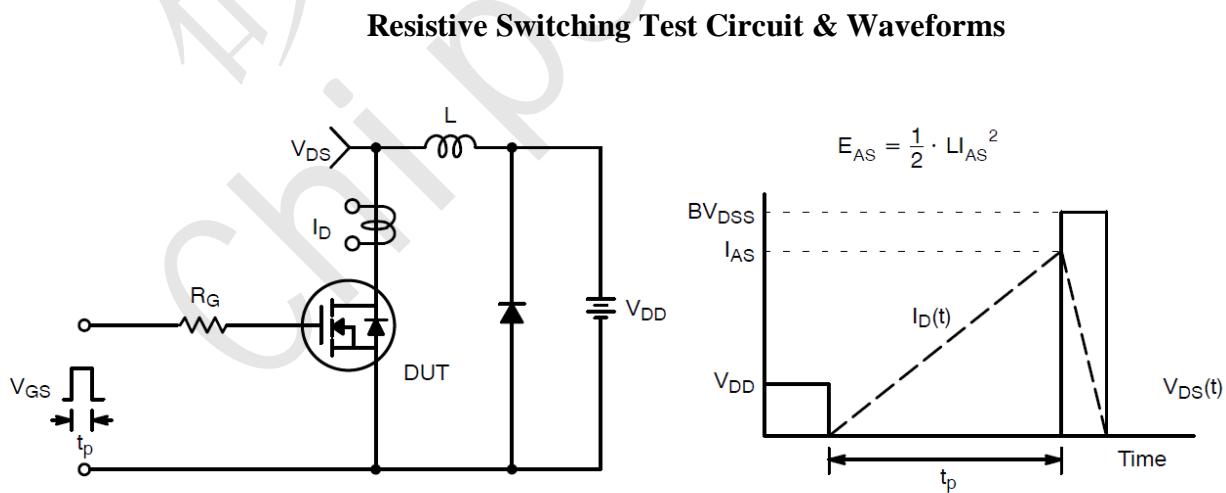
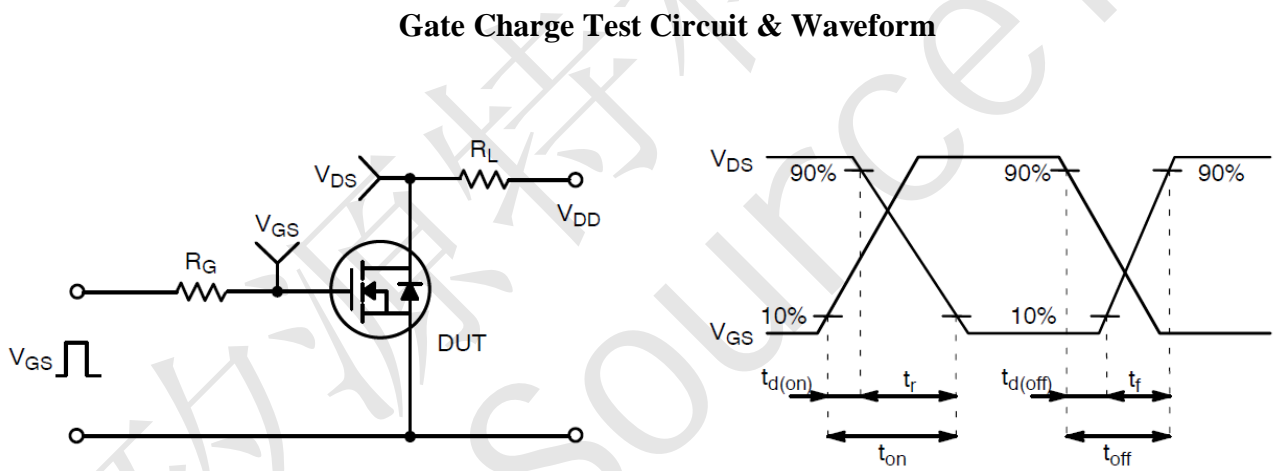
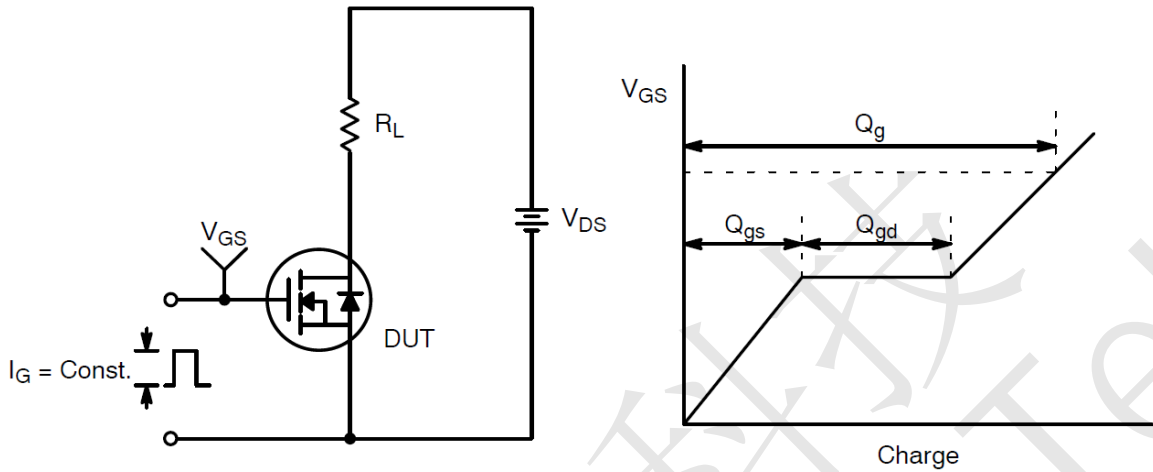


Figure 13: Normalized Maximum Transient Thermal Impedance



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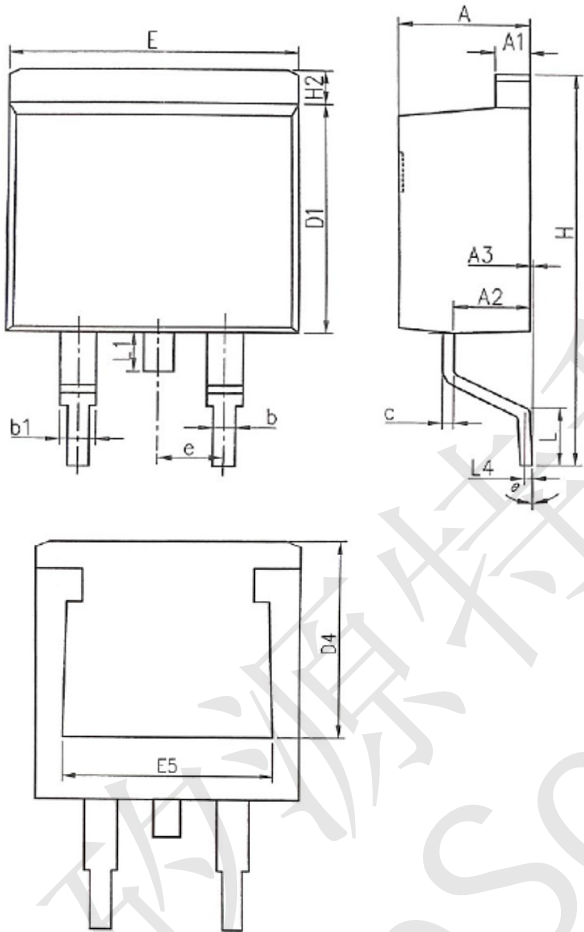
### CSTS150N10G Test Circuit and Waveform:





CSTS150N10G Mechanical Dimensions for TO-263

COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	4.37	4.89
A1	1.17	1.42
A2	2.20	2.90
A3	0.00	0.25
b	0.70	0.96
b1	1.17	1.47
c	0.28	0.60
D1	8.45	9.30
D4	6.60	-
E	9.80	10.40
E5	7.06	-
e	2.54BSC	
H	14.70	15.70
H2	1.07	1.47
L	2.00	2.80
L1	-	1.75
L4	0.254BSC	
θ	0°	9°