N and P Channel Enhancement Mode Power MOSFET

CST83G30F Description

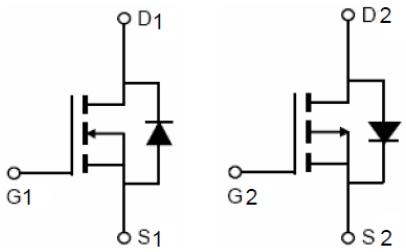
The CST83G30F uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

CST83G30F General Features

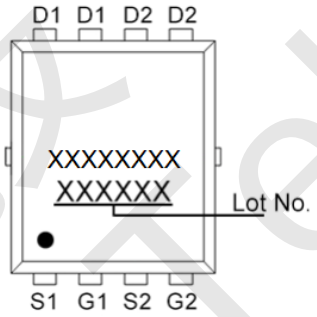
- **N-Channel**
- V_{DS} = 30V, I_D = 30A
  $R_{DS(ON)}$ < 10.5mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ < 18mΩ @ V_{GS}=4.5V
- **P-Channel**
- V_{DS} = -30V, I_D = -30A
  $R_{DS(ON)}$ < 22mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ < 30mΩ @ V_{GS}=-4.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

CST83G30F Application

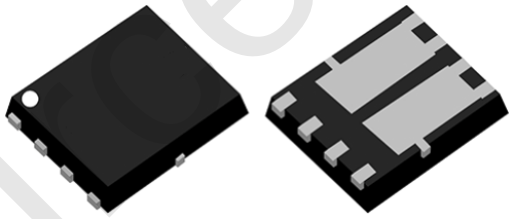
- DC motor
- PWM applications



Schematic diagram



Marking and pin assignment



DFN5x6-8L

CST83G30F Absolute Maximum Ratings (TC=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Drain Current-Continuous	I_D	30	-30	A
Drain Current-Continuous (TC=100℃)	I_D	21	-21	A
Pulsed Drain Current (Note 1)	I_{DM}	90	-90	A
Maximum Power Dissipation	P_D	30	30	W
Avalanche Energy (L=0.5mH)	E_{AS}	24	36	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150		℃

CST83G30F Thermal Characteristic

Parameter	Symbol	N-Channel	P-Channel	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.16	4.16	℃/W

CST83G30F N-Channel Electrical Characteristics (TC=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=10A	-	8.5	10.5	mΩ
		V_{GS}=4.5V,I_D=5A	-	12	18	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=8A	10	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=15V,V_{GS}=0V, F=1.0MHz	-	840	-	pF
Output Capacitance	C_{oss}		-	120	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	85	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V,I_D=2A,R_L=1Ω, V_{GS}=10V,R_G=3Ω	-	4.2	-	nS
Turn-on Rise Time	t_r		-	8.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	31	-	nS
Turn-Off Fall Time	t_f		-	4	-	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=10A,V_{GS}=10V	-	14	-	nC
Gate-Source Charge	Q_{gs}		-	2.4	-	nC
Gate-Drain Charge	Q_{gd}		-	3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=1A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	16	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product.

CST83G30F Typical Electrical and Thermal Characteristics

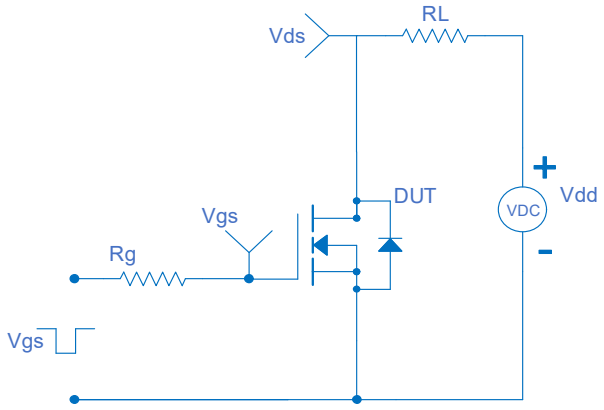


Figure 1 Switching Test Circuit

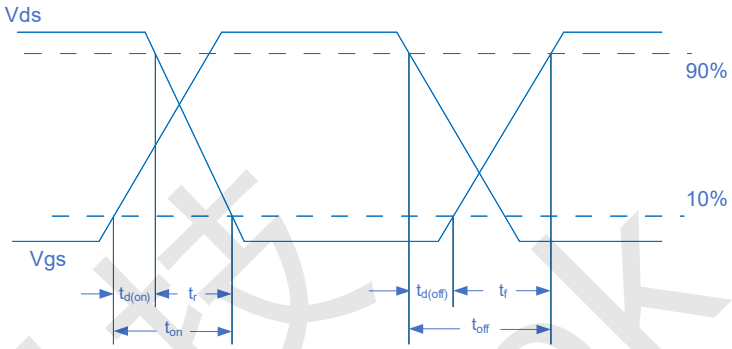


Figure 2 Switching Waveform

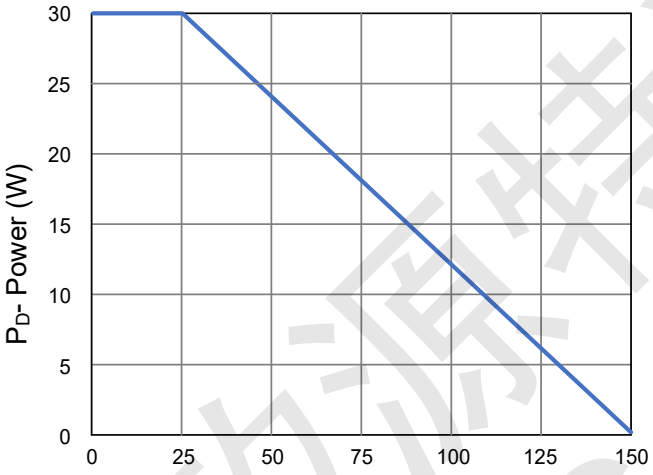


Figure 3 Power De-rating

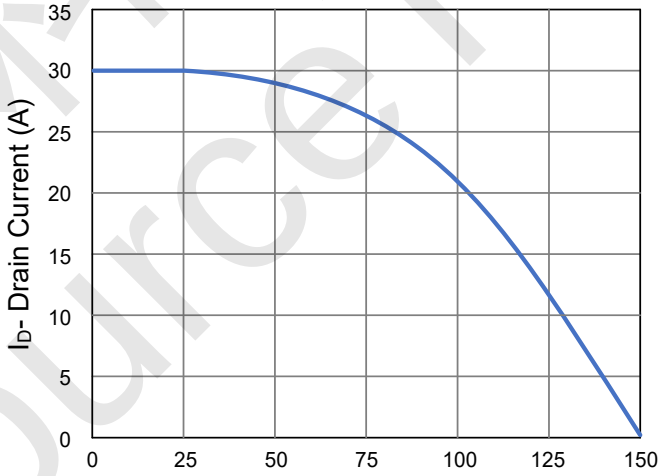


Figure 4 Drain Current

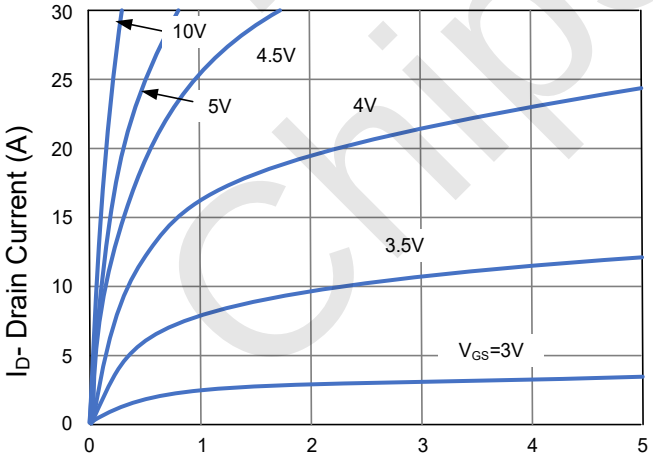


Figure 5 Output Characteristics

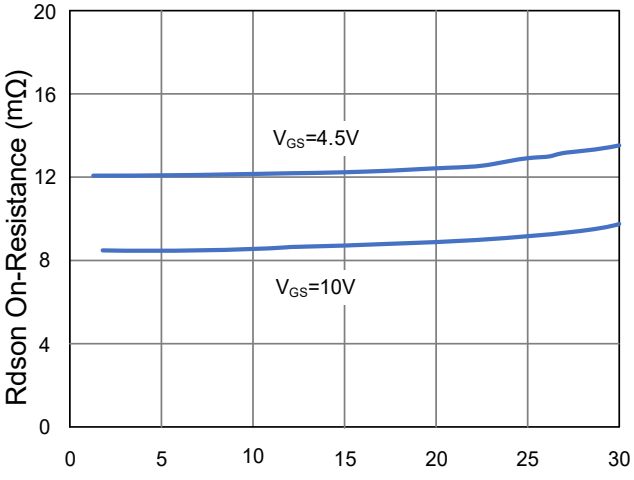


Figure 6 Rdson vs Drain Current

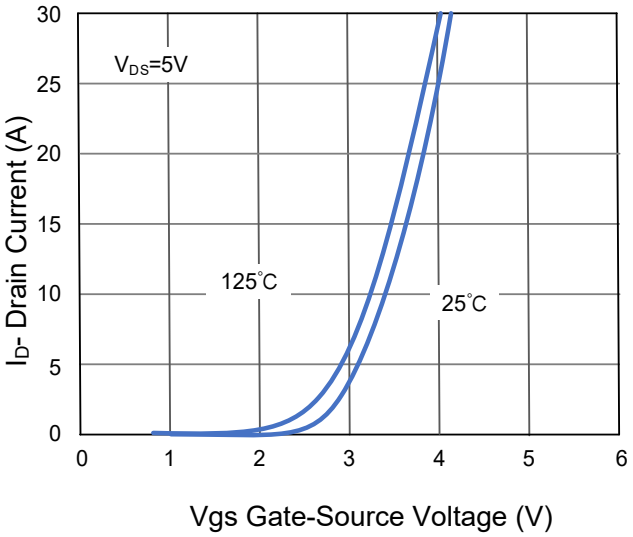


Figure 7 Transfer Characteristics

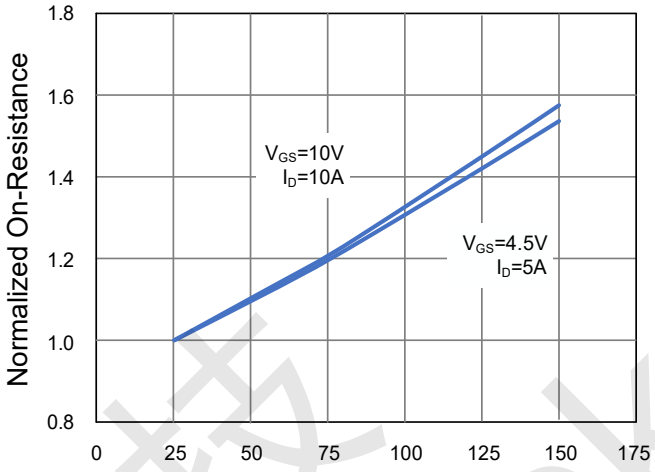


Figure 8 Rdson vs Junction Temperature

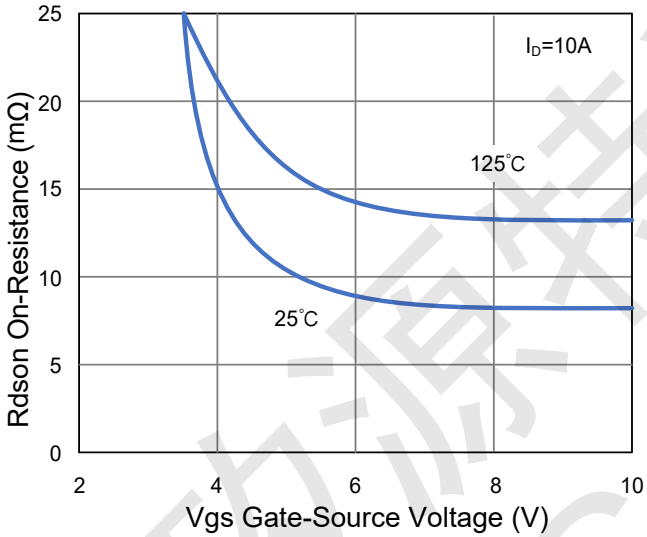


Figure 9 Rdson vs Vgs

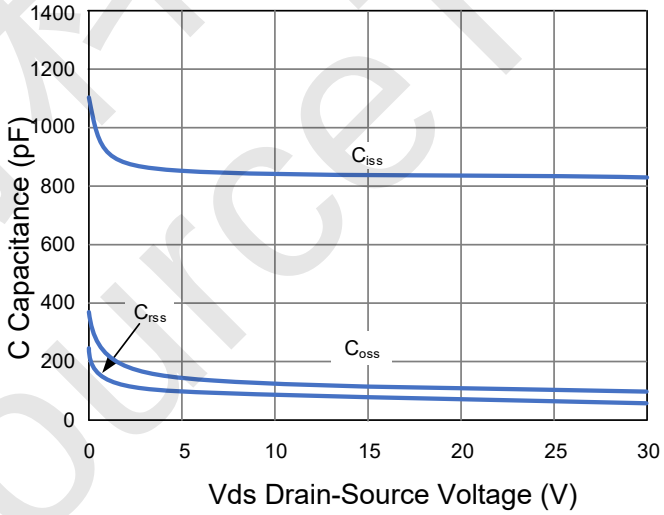


Figure 10 Capacitance vs Vds

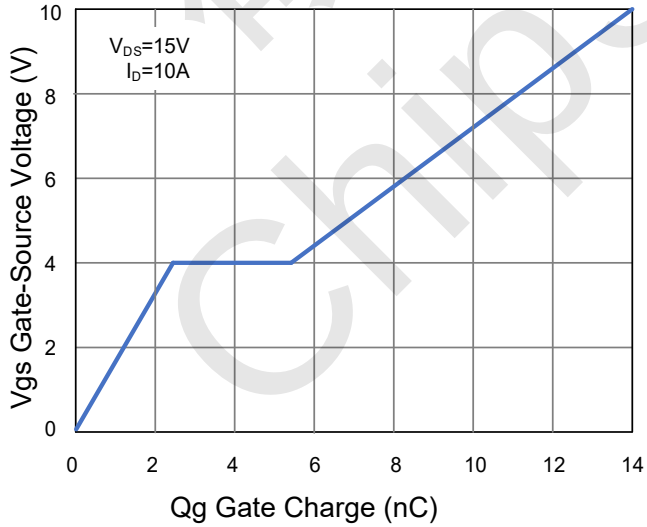


Figure 11 Gate Charge

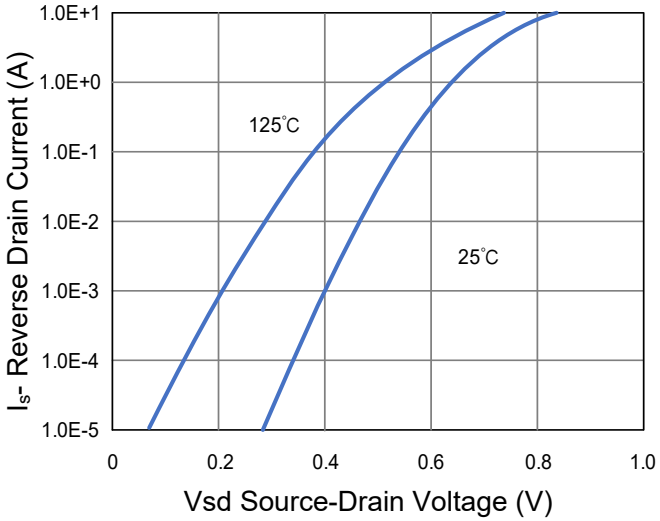


Figure 12 Source- Drain Diode Forward

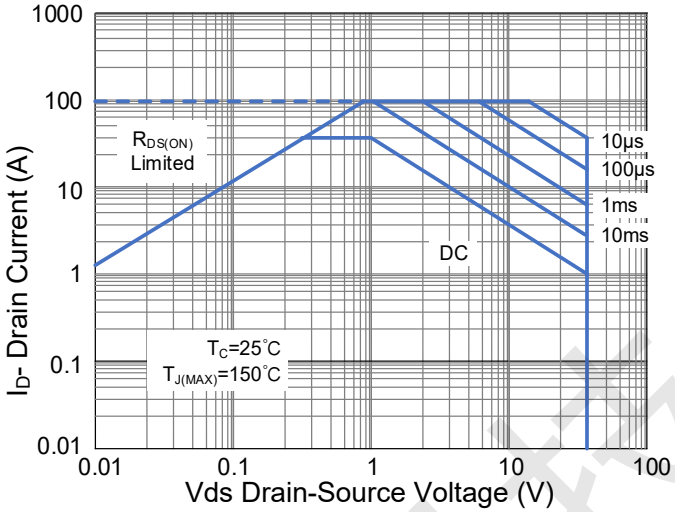


Figure 13 Safe Operation Area

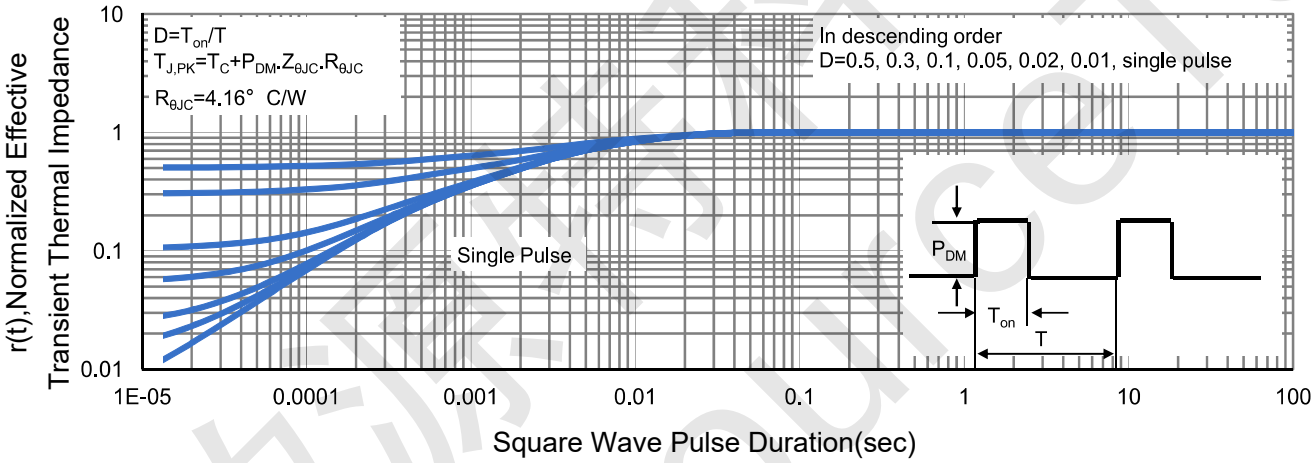


Figure 14 Normalized Maximum Transient Thermal Impedance

CST83G30F P-Channel Electrical Characteristics (TC=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.6	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V,I_D=-10A	-	16	22	mΩ
		V_{GS}=-4.5V,I_D=-5A	-	22	30	mΩ
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	-	1470	-	pF
Output Capacitance	C_{oss}		-	181	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	167	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, R_L=1Ω, V_{GS}=-10V,R_G=3Ω	-	10	-	nS
Turn-on Rise Time	t_r		-	5.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	26	-	nS
Turn-Off Fall Time	t_f		-	9	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-10A, V_{GS}=-10V	-	18	-	nC
Gate-Source Charge	Q_{gs}		-	3.6	-	nC
Gate-Drain Charge	Q_{gd}		-	5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-1A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-16	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product.

CST83G30F Typical Electrical and Thermal Characteristics

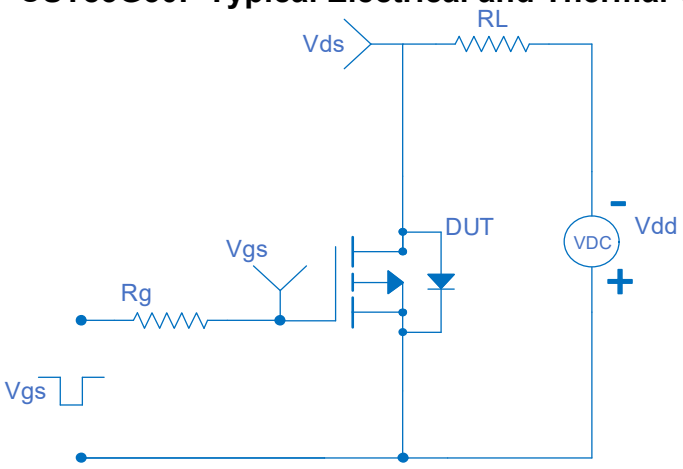


Figure 1 Switching Test Circuit

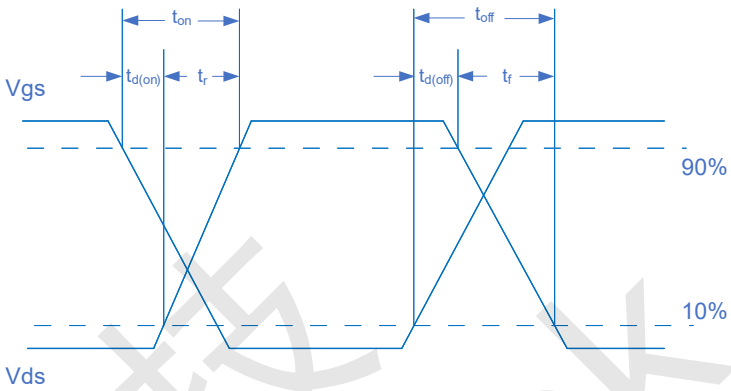


Figure 2 Switching Waveform

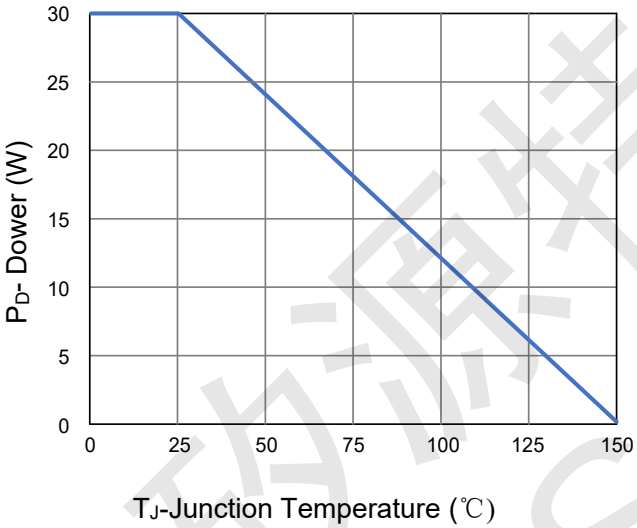


Figure 3 Power De-rating

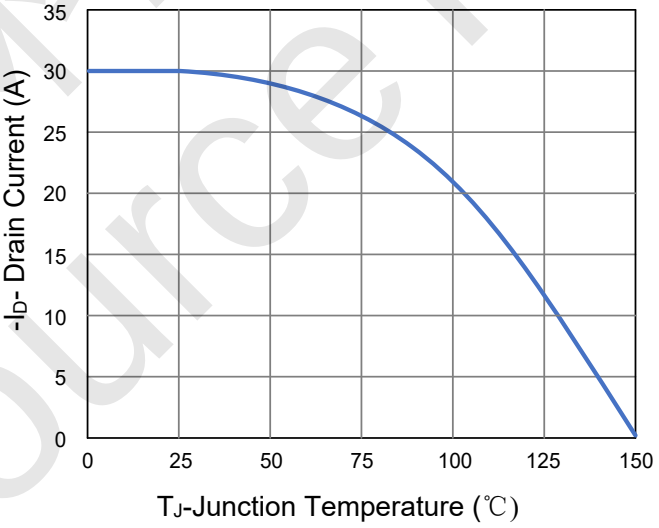


Figure 4 Drain Current

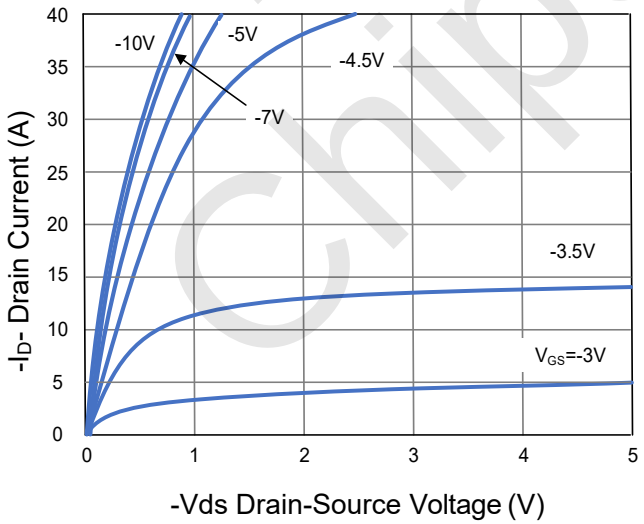


Figure 5 Output Characteristics

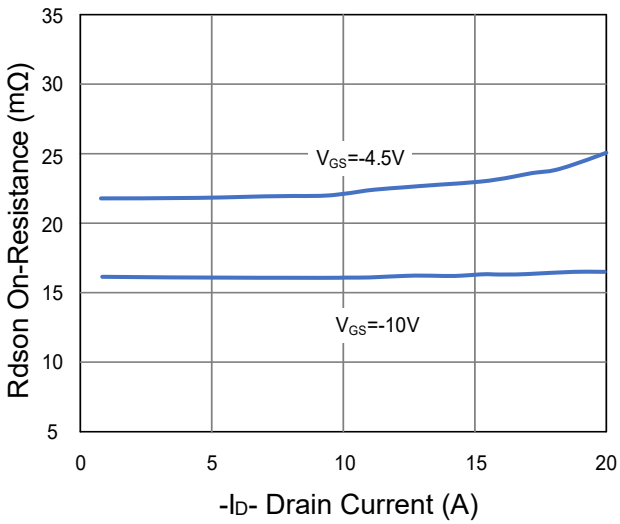


Figure 6 Rdson vs Drain Current

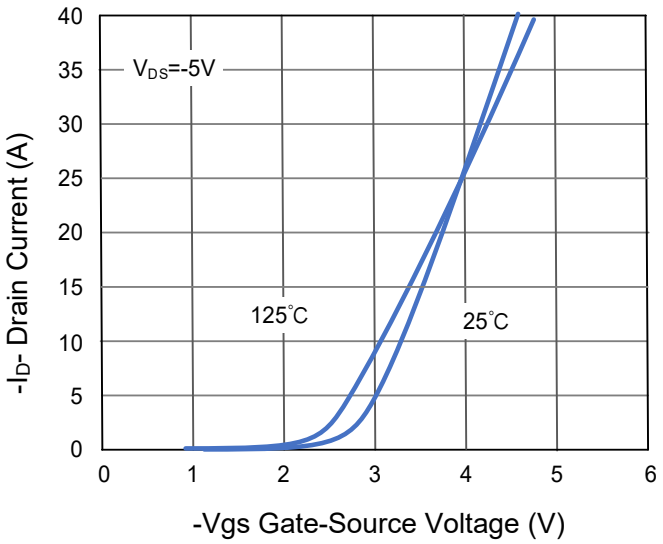


Figure 7 Transfer Characteristics

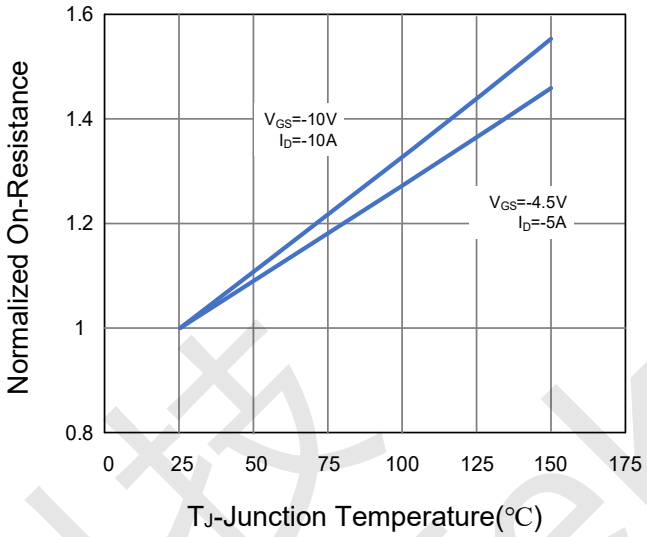


Figure 8 Rdson vs Junction Temperature

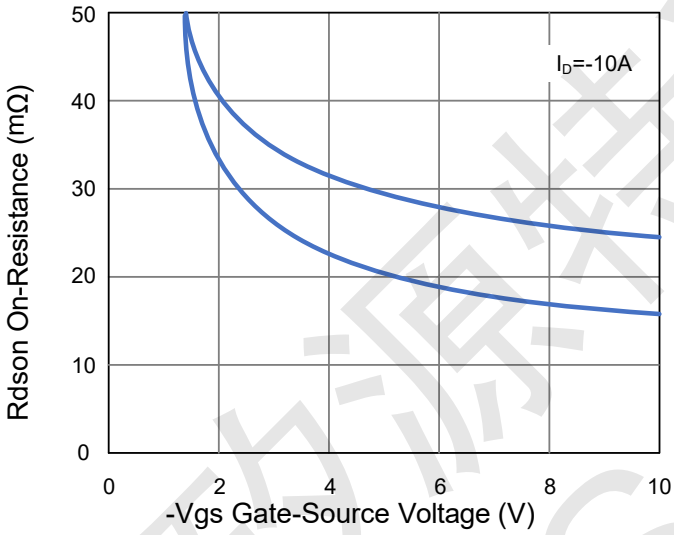


Figure 9 Rdson vs Vgs

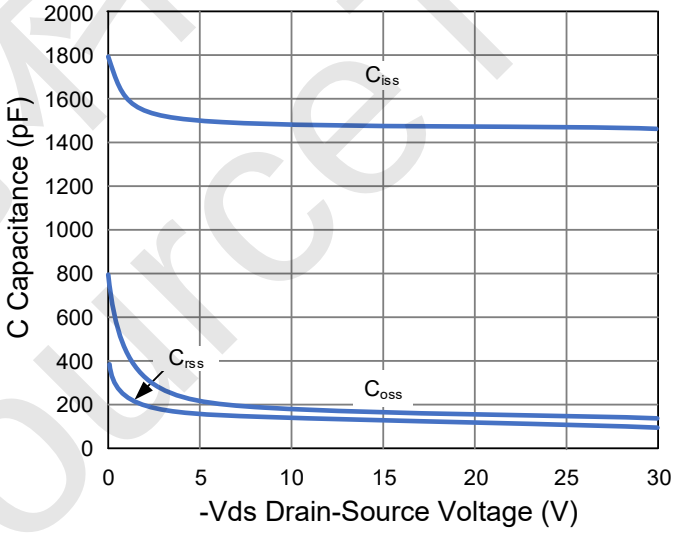


Figure 10 Capacitance vs Vds

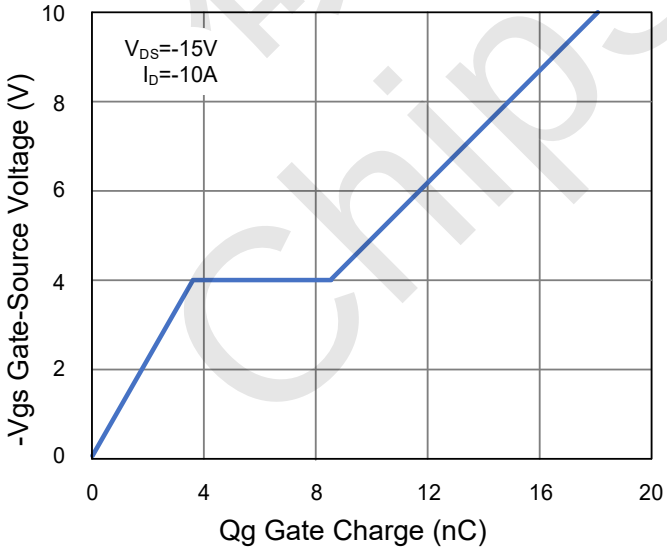


Figure 11 Gate Charge

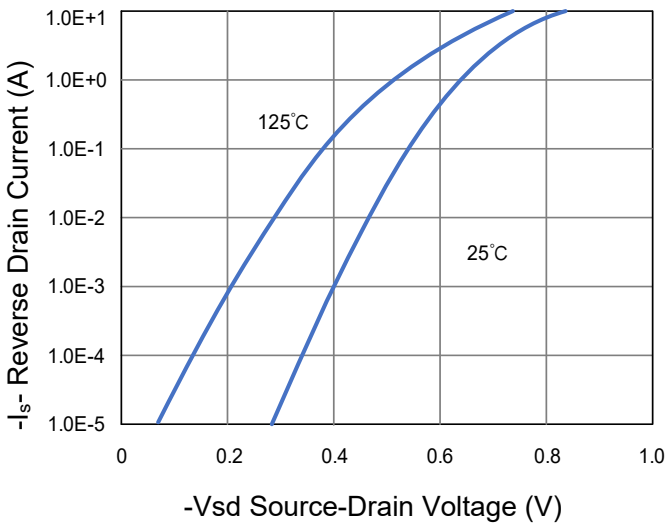


Figure 12 Source- Drain Diode Forward

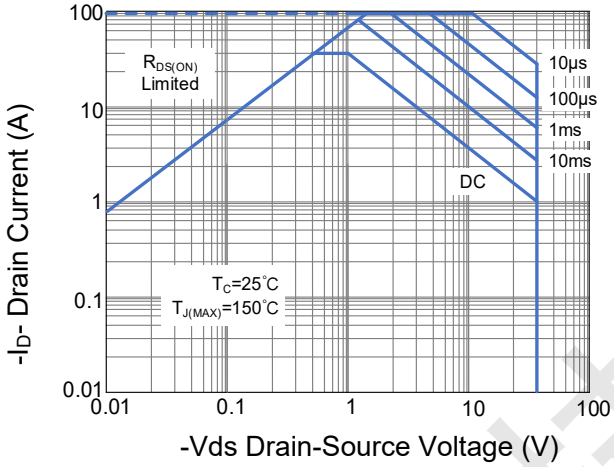


Figure 13 Safe Operation Area

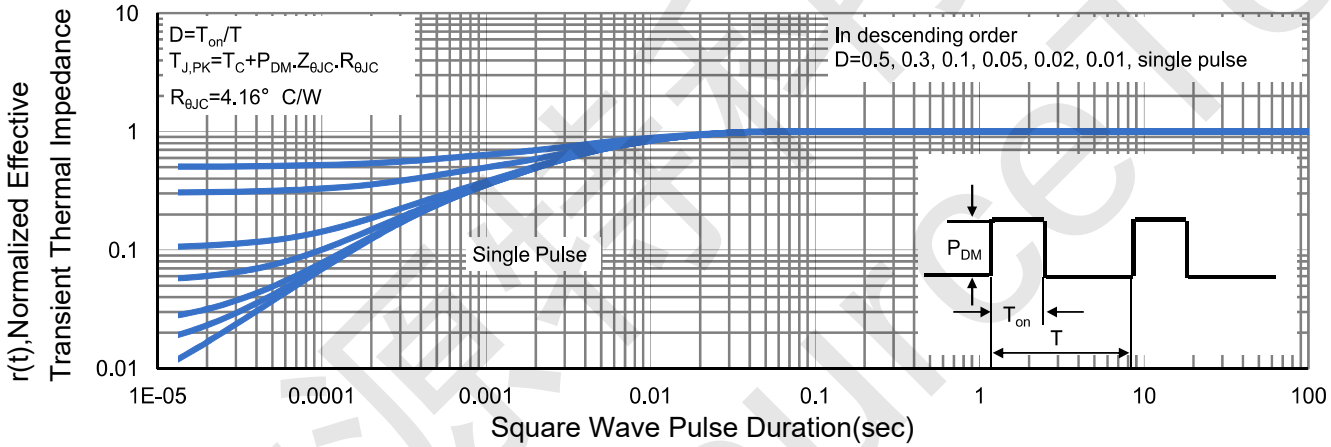
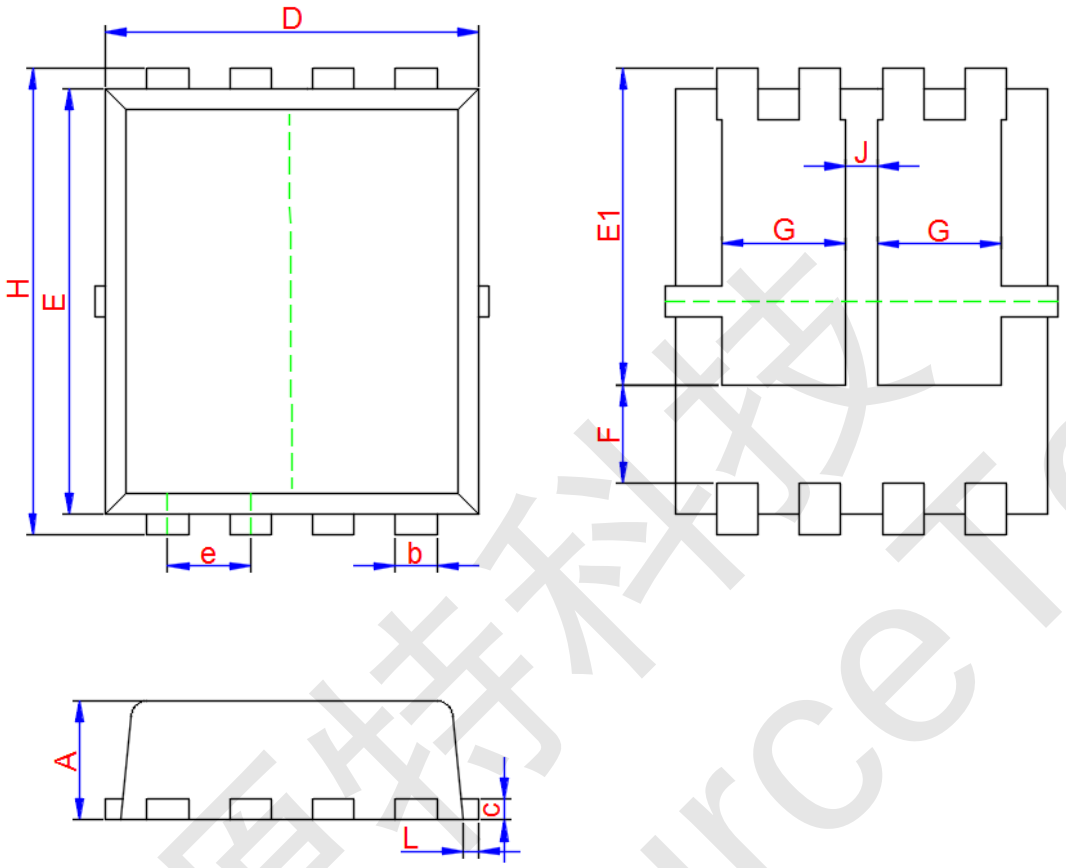


Figure 14 Normalized Maximum Transient Thermal Impedance

CST83G30F DFN5x6-8L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.850	0.950	1.050
b	0.300 TYP.		
c	0.254 TYP.		
D	5.100	5.200	5.300
e	1.270 TYP.		
E	5.450	5.550	5.650
E1	3.900	4.100	4.300
F	1.090	1.290	1.490
G	1.500	1.700	1.900
H	5.850	6.050	6.250
J	0.400	0.600	0.800
L	0.150 MAX.		