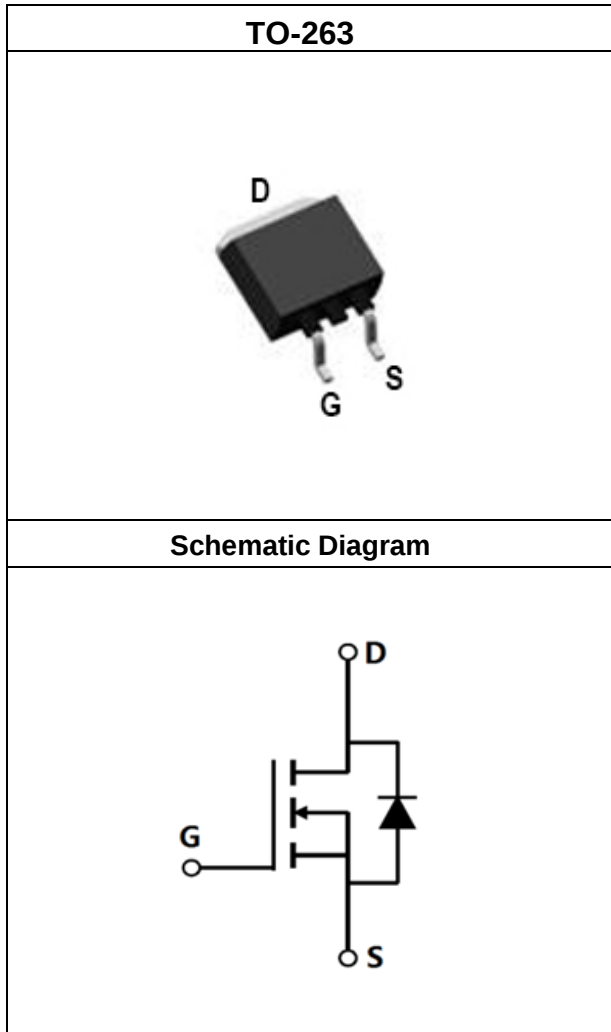


N-channel 60V, 7.5mΩ typ.,
SGT MOSFET S2 in TO-263

Datasheet - Preliminary data

1. Descriptions



Key Performance Parameters

Parameters	Value	Unit
BV_{DSS}	60	V
$R_{DS(on),max}$	9	mΩ
P_D	75	W
I_D	60	A

Features

- High Speed Power Switching, Logic level
- Enhanced Body diode dv/dt capability
- Enhanced Avalanche Ruggedness
- 100% UIS Tested, 100% Rg Tested
- Lead Free, Halogen Free

Applications

- DC/DC Converter
- Motor Drivers
- Ideal for high-frequency switching and synchronous rectification

Type/Ordering Code	Package	Marking	Related Links
CSB090N06S2	TO-263	090N06S2	See Appendix A

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2. Maximum Ratings

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Absolute Maximum Ratings

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
V_{DS}	Drain-source voltage	-	-	60	V	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$
V_{GS}	Gate source voltage	-20	-	20	V	static; AC ($f>1\text{ Hz}$)
I_D	Continuous drain current	-	-	60 43	A	$T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$
$I_{D,pulse}$	Pulsed drain current	-	-	240	A	$T_C=25^\circ\text{C}$
P_D	Power dissipation	-	-	75	W	$T_C=25^\circ\text{C}$
E_{AS}	Avalanche energy, single pulse ¹⁾	-	-	180	mJ	$I_D=6\text{A}$; $V_{DD}=50\text{V}$
T_j, T_{stg}	Operating and storage temperature	-55	-	175	$^\circ\text{C}$	-

3. Thermal Characteristics

Thermal Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
R_{thJC}	Thermal resistance, junction - case	-	-	2	$^\circ\text{C/W}$	$T_C = 25^\circ\text{C}$
R_{thJA}	Thermal resistance, junction - ambient	-	-	75	$^\circ\text{C/W}$	$T_C = 25^\circ\text{C}$

4. Electrical Characteristics

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		

Off Characteristics

$V_{(BR)DSS}$	Drain-source breakdown voltage	60	-	-	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Zero gate voltage drain current	-	-	1	μA	$V_{DS}=60V, V_{GS}=0V$
I_{GSS}	Gate-source leakage current	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$

On Characteristics³⁾

$V_{(GS)th}$	Gate threshold voltage	1.0	1.8	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$R_{DS(on)}$	Drain-source on-state resistance	-	7.5 10	9 14	m Ω	$V_{GS}=10V, I_D=20A$ $V_{GS}=4.5V, I_D=10A$
R_G	Gate resistance	-	2.6	-	Ω	$V_{DD}=0V, V_{GS}=0V, F=1MHz$
g_{fs}	Transconductance		80		S	$V_{DS}=5V, I_D=20A$

Dynamic Characteristics

C_{iss}	Input capacitance	-	1480	-	pF	$V_{GS}=0V, V_{DS}=30V,$ $F=1MHz$
C_{oss}	Output capacitance	-	290	-	pF	
C_{rss}	Reverse transfer capacitance	-	4.1	-	pF	

Switching Characteristics⁴⁾

$t_{d(on)}$	Turn-on delay time	-	11	-	ns	$V_{DD}=30V, V_{GS}=10V,$ $I_D=14.5A, R_G=3\Omega$
t_r	Turn-on rise time	-	5	-	ns	
$t_{d(off)}$	Turn-off delay time	-	56	-	ns	
t_f	Turn-off fall time	-	12	-	ns	
Q_g	Gate charge total	-	23	-	nC	$V_{DD}=30V, I_D=14.5A, V_{GS}=10V$
Q_{gs}	Gate to source charge	-	4.8	-	nC	
Q_{gd}	Gate to drain charge	-	2.4	-	nC	

Reverse Diode Characteristics

V_{SD}	Diode forward voltage ³⁾	-	0.9	1.2	V	$V_{GS}=0V, I_F=20A$
I_S	Diode forward current ²⁾	-	-	60	A	
t_{rr}	Reverse recovery time	-	32	-	ns	$V_{GS}=0V, I_F=14.5A,$ $di_F/dt=100A/\mu s^3)$
Q_{rr}	Reverse recovery charge	-	46	-	μC	

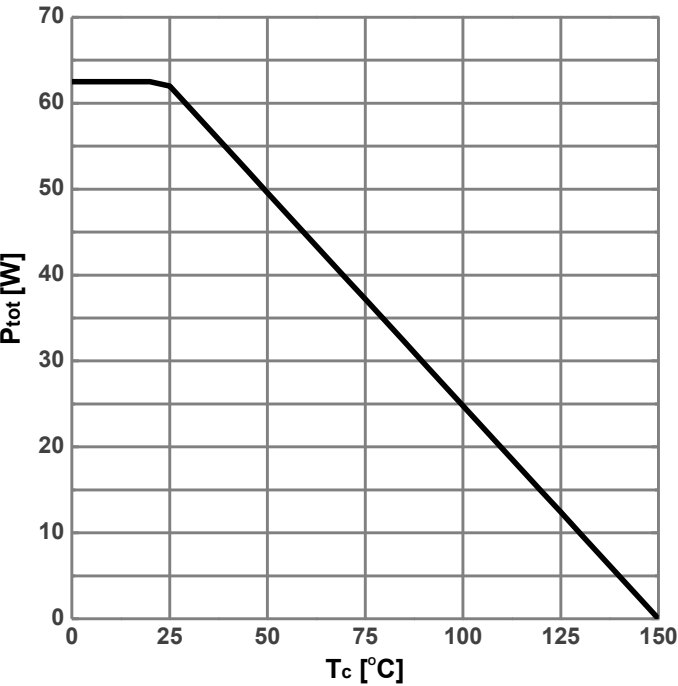
1) $V_{DD}=50V, L=10mH, R_G=25\Omega$, Starting $T_j=25^\circ\text{C}$.2) Surface Mounted on FR4 Board, $t \leq 10$ sec.3) Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

4) Guaranteed by design, not subject to production

5) Repetitive Rating: Pulse width limited by maximum junction temperature.

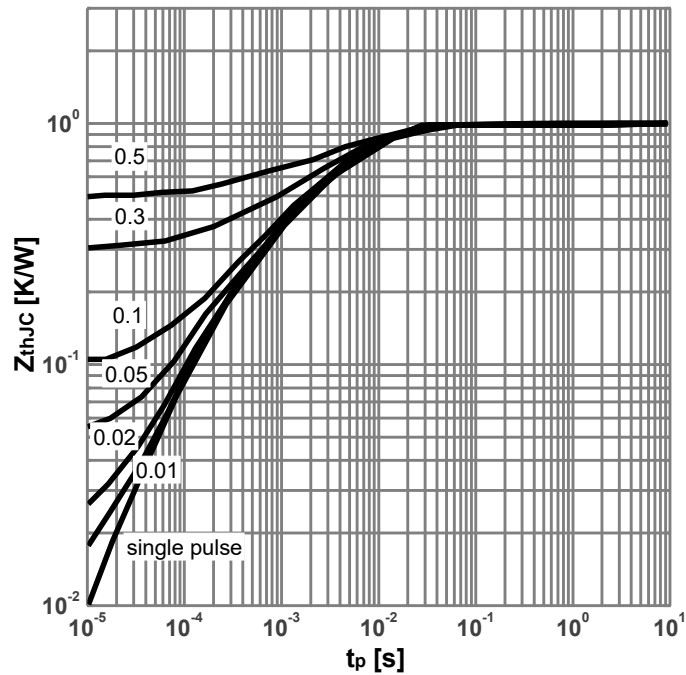
5. Electrical Characteristics Diagrams

Diagram 1: Power dissipation



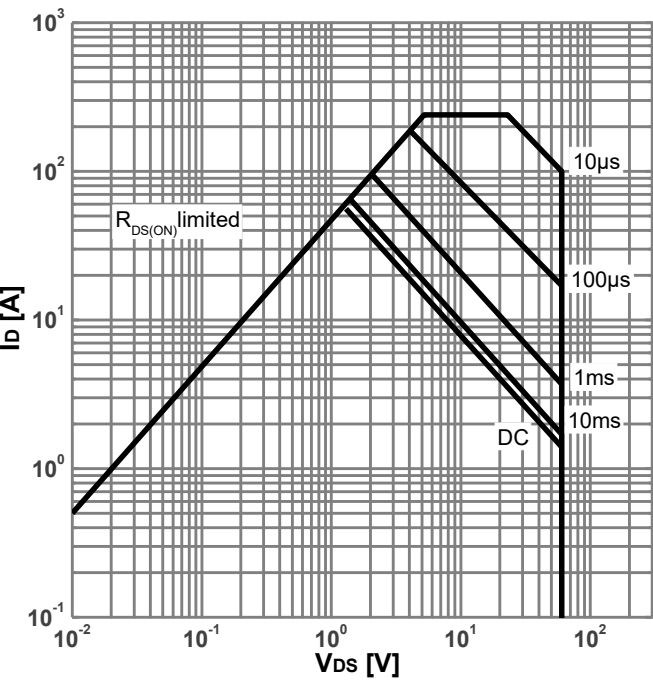
$P_{tot}=f(T_c)$

Diagram 2: Max. transient thermal impedance



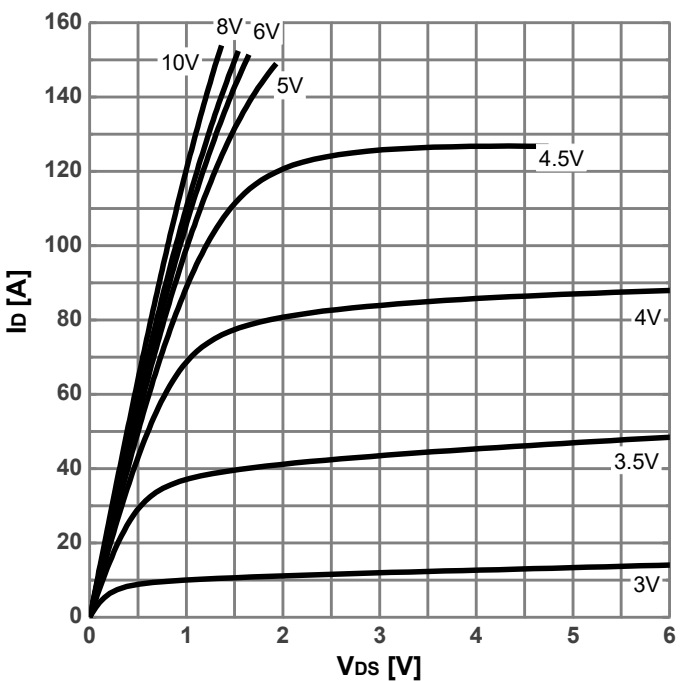
$Z_{thJC}=f(t_p)$; parameter: $D= t_p/T$

Diagram 3: Safe operating area



$I_D=f(V_{DS})$; $T_J=25^{\circ}C$; $D=0$; parameter: t_p

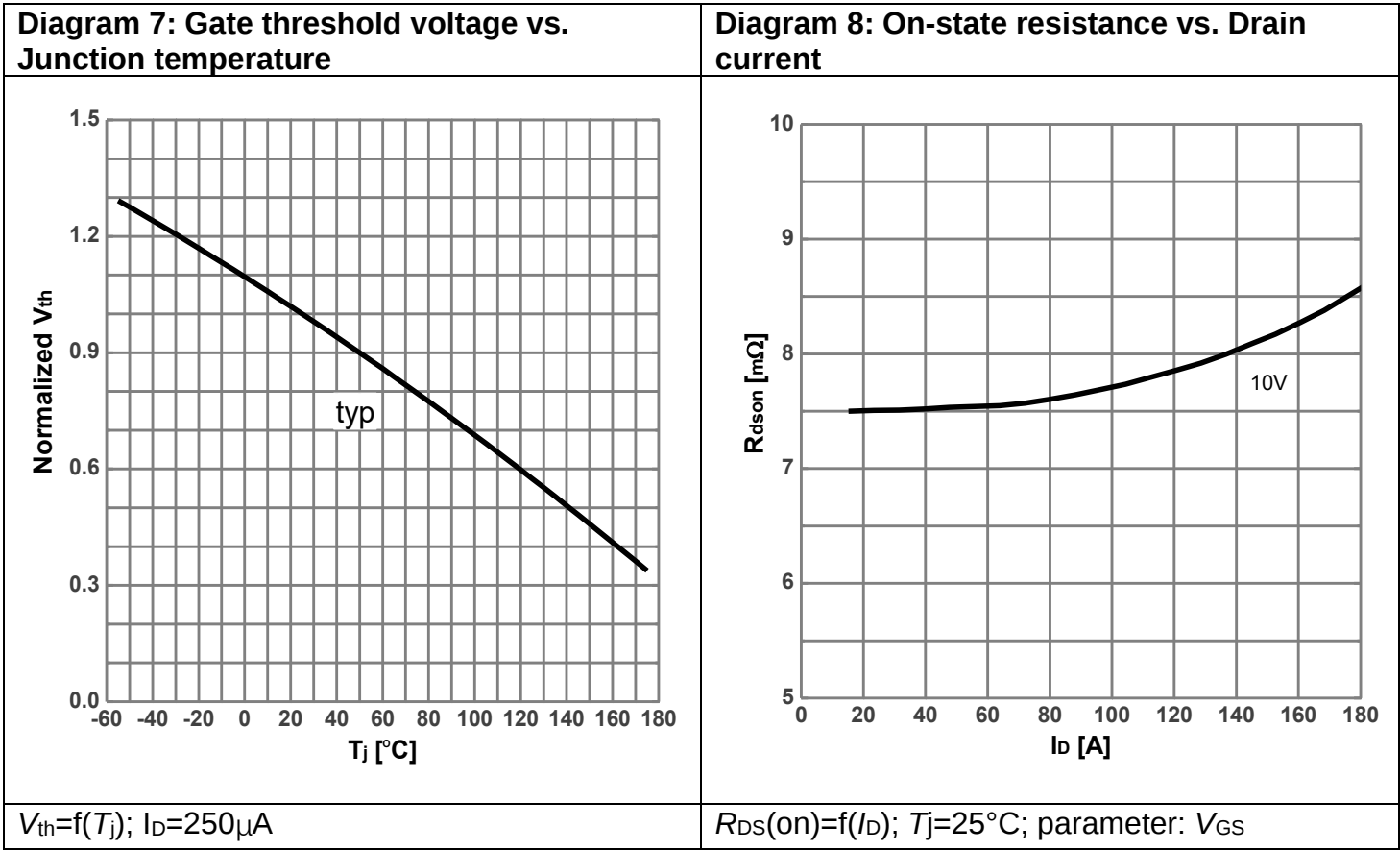
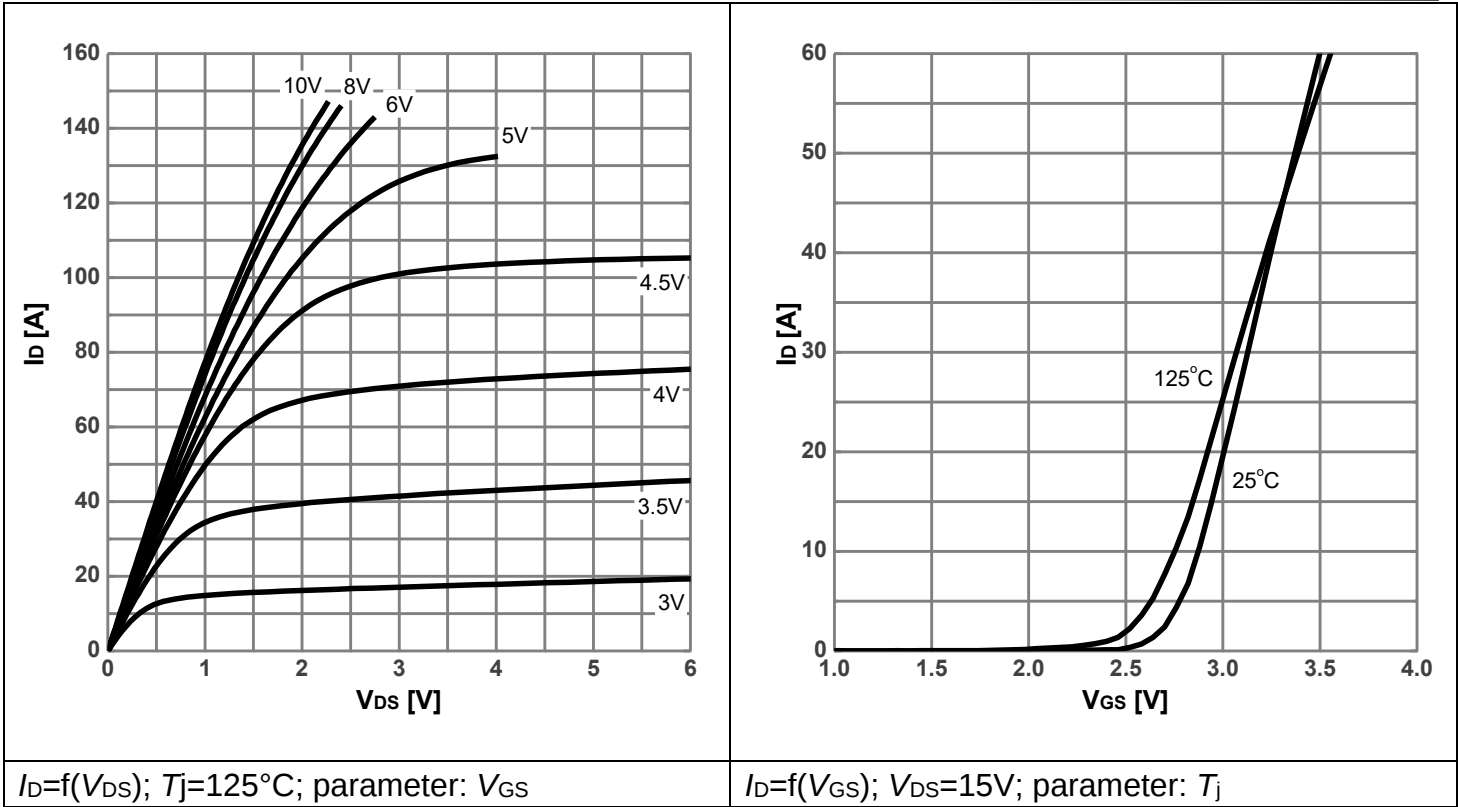
Diagram 4: Typ. output characteristics



$I_D=f(V_{DS})$; $T_J=25^{\circ}C$; parameter: V_{GS}

Diagram 5: Typ. output characteristics

Diagram 6: Typ. transfer characteristics



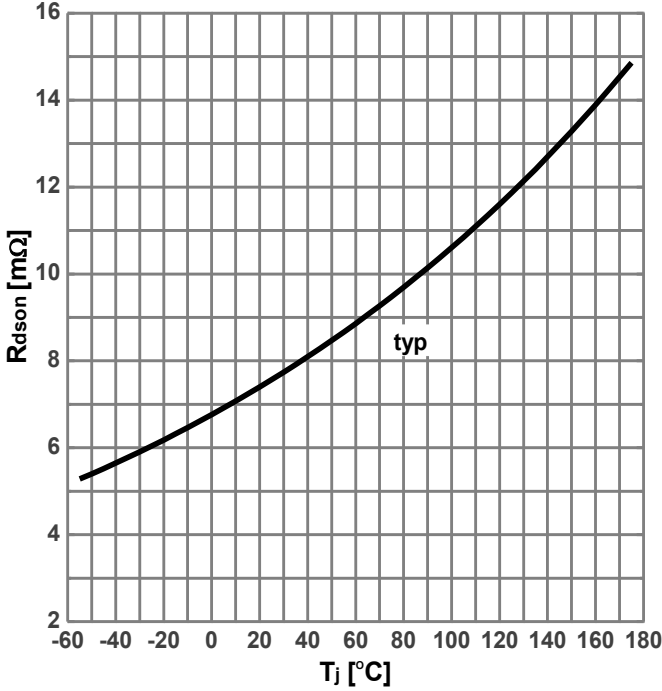
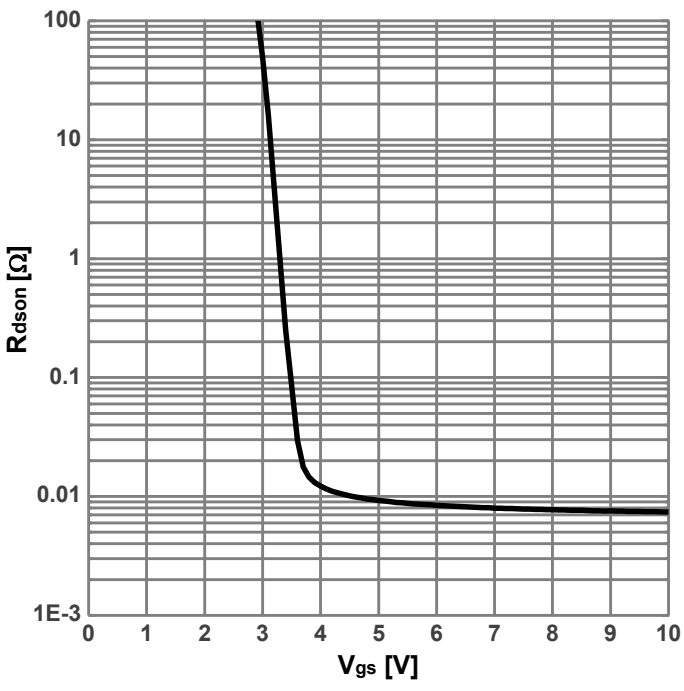
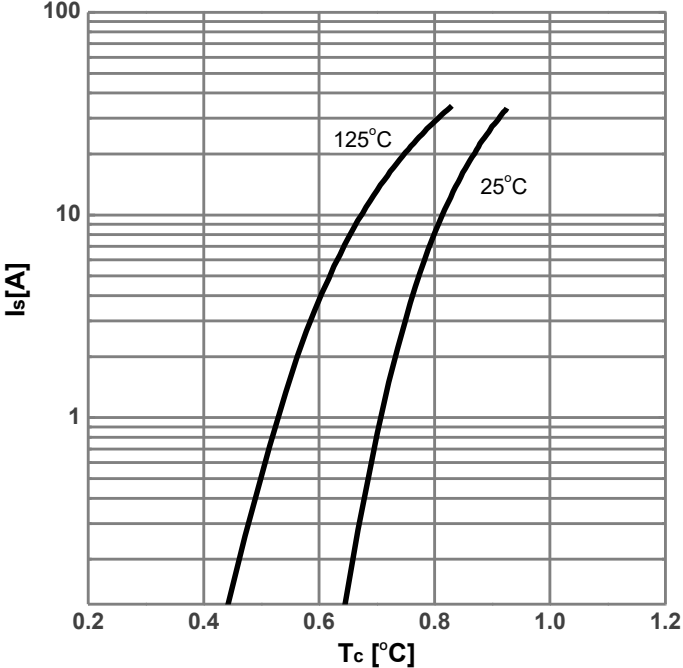
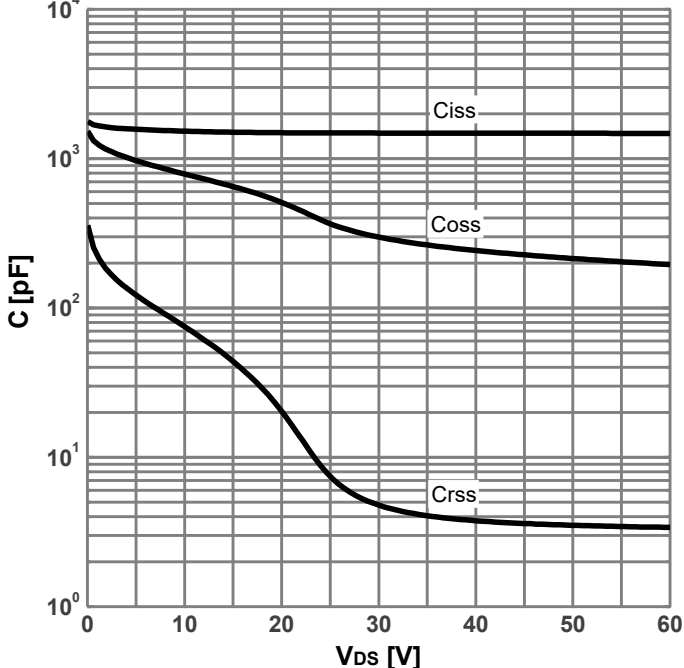
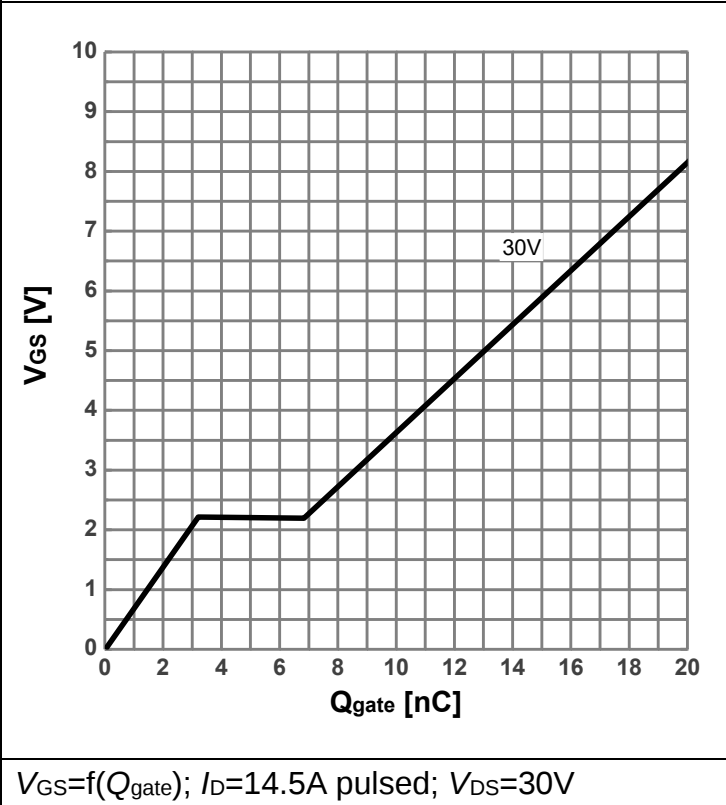
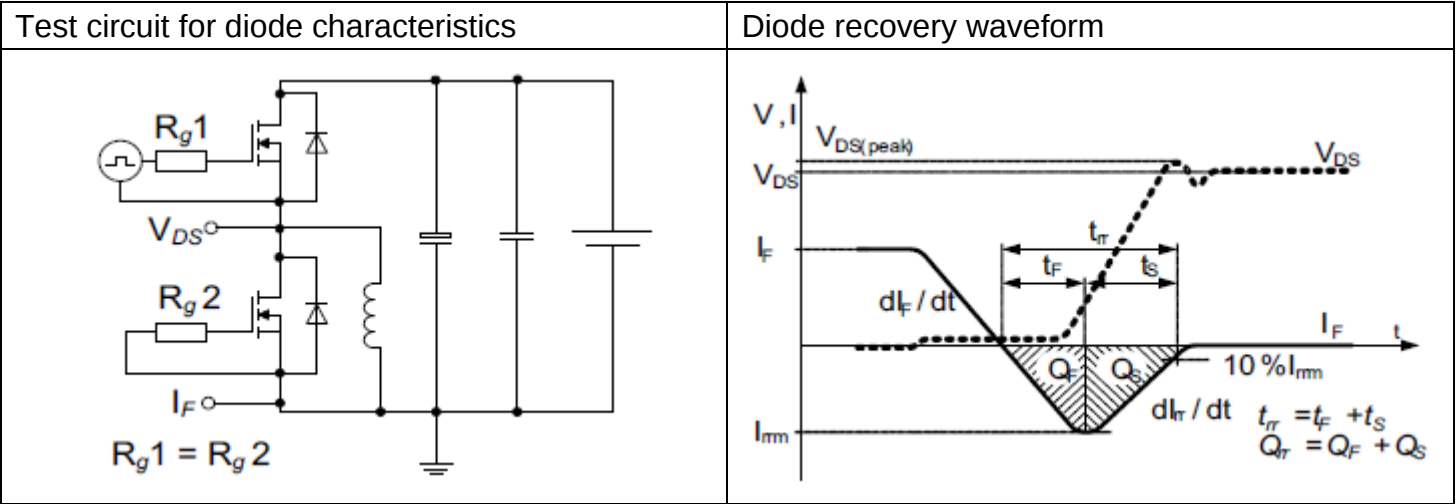
temperature	characteristics
 $R_{DS(on)} = f(T_j)$; $I_D = 20A$; $V_{GS} = 10V$	 $R_{DS(on)} = f(V_{GS})$; $T_j = 25^{\circ}C$; $I_D = 20A$
Diagram 11: Forward characteristics of reverse diode  $I_F = f(V_{SD})$; parameter: T_j	Diagram 12: Typ. capacitances  $C = f(V_{DS})$; $V_{GS} = 0V$; $f = 1MHz$

Diagram 13: Typ. gate charge

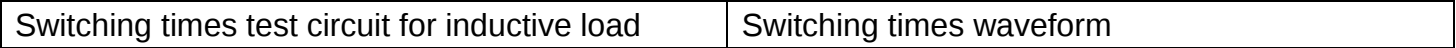


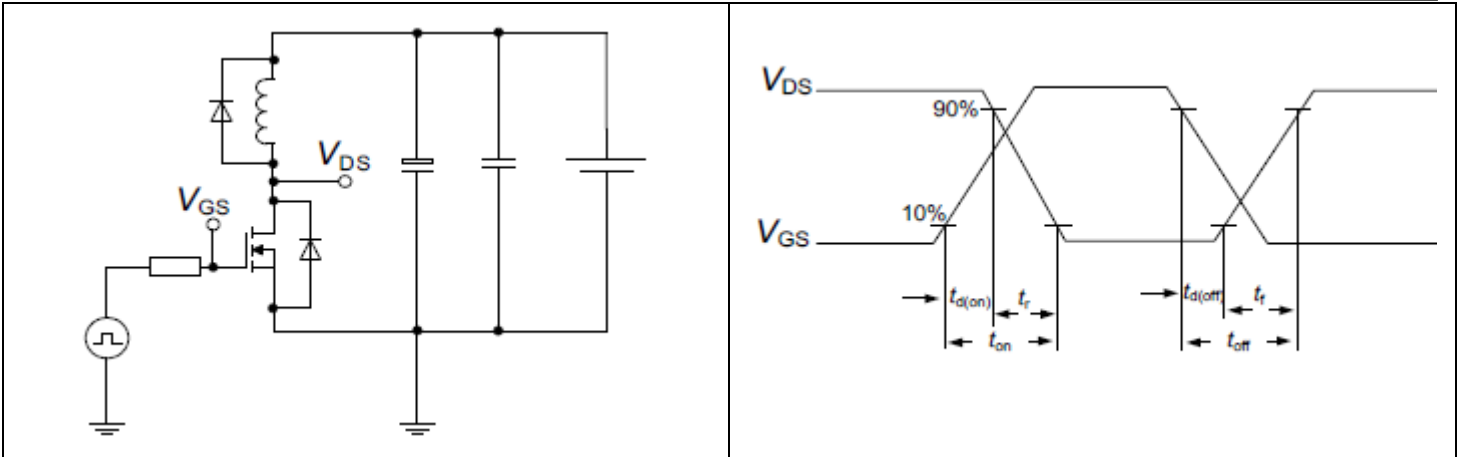
6. Test Circuits

Diode Characteristics

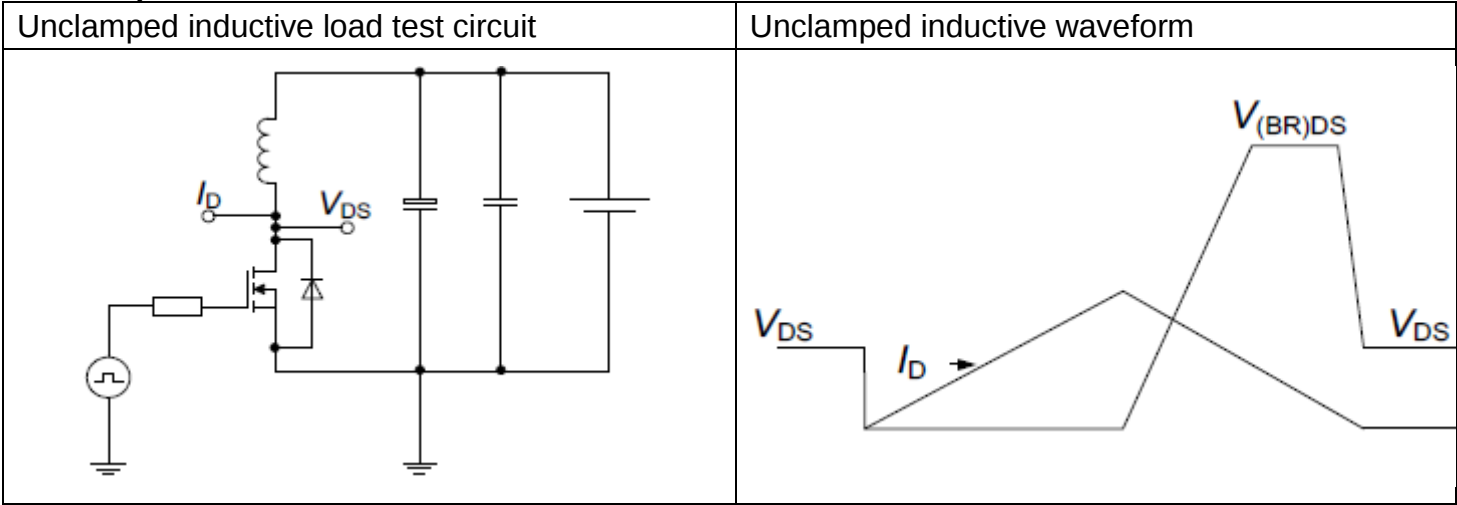


Switching Times





Unclamped Inductive Load

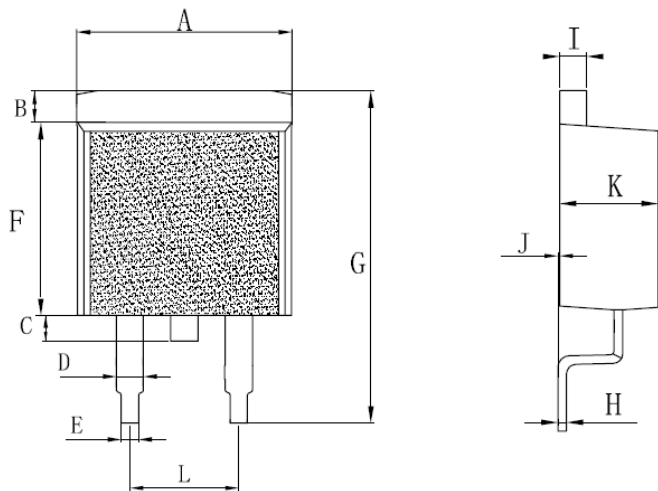


7. Package Outlines

Figure 1 Outline TO-263 Dimensions in mm

PACKAGE OUTLINE DIMENSIONS

T0-263



DIM.	Unit(mm)		Unit(inch)	
	Min	Max	Min	Max
A	9.7	10.4	0.381	0.409
B	1.31	1.62	0.051	0.063
C	0.65	1.22	0.025	0.048
D	1.15	1.36	0.045	0.053
E	0.62	0.95	0.024	0.037
F	8.75	9.32	0.344	0.366
G	14.75	15.8	0.580	0.622
H	0.32	0.48	0.012	0.018
I	1.18	1.36	0.046	0.053
J	0	0.15	0	0.005
K	4.38	4.86	0.172	0.191
L	4.85	5.23	0.190	0.205

8. Appendix

CoolSemi Webpage: www.coolsemi.com.

