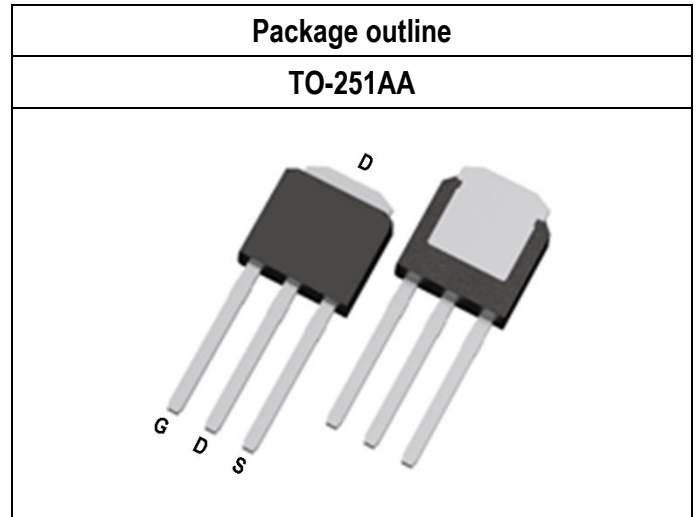


Key parameter	N _{channel}	Unit
V _{(BR)DSS} min.	30	V
R _{DS(ON)} max. V _{GS} =10V	5.5	mΩ
R _{DS(ON)} max. V _{GS} =4.5V	6.0	mΩ
I _D	120	A
V _{GS(TH)} Typ.	0.7	V
C _{iss} Typ.	3062	pF
Q _g 10V Typ.	66.9	nC



Description

The SG30N10I used advanced trench technology of MOSFET to provide excellent electrical parameter. There is high speed switching capability, low R_{DS(ON)} resistance, stabilizing qualified and characteristics for these devices. Moreover, it is had extreme high cell density in design. These features combine to be an advantage design for use in wide variety of application including small signal control and load switch application.

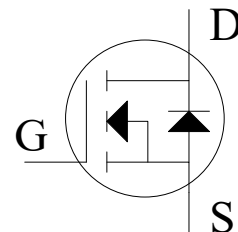
Features

- ◇ Fast switch capacity
- ◇ Low R_{DS(ON)} resistance
- ◇ With voltage logic level driving characteristics
- ◇ Pb-free lead plating; RoHS compliant

Potential application

- Signal control
- Small power and load switch
- Networking system or equipment
- DC-DC power system for Monitor/TV
- Consumed electronics

Symbol and Pin assignment



Order Information

Item	Description
1. Order Code	SG30N10I
2. Part Number	SG30N10I
3. Package Type	TO-251AA
4. Package Code	I
5. Packing Type	Tube
6. Quantity in Pack	75
7. RoHS Status	Halogen-Free

Content

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2.	Thermal Resistance Ratings -----	3
3.	Electrical Characteristics -----	4
4.	Typical Operating Characteristics Diagram -----	5-7
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6.	Package of Dimension -----	9
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1. Absolute Maximum Ratings ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 12	V
Drain Current-Continuous ^{Note 1}	$T_C=25^\circ\text{C}$	I_D	120	A
	$T_C=100^\circ\text{C}$		60.3	A
Drain Current-Continuous ^{Note 2}	$T_A=25^\circ\text{C}$	I_D	17.6	A
	$T_A=70^\circ\text{C}$		13.0	A
Drain Current-Pulsed ^{Note 3}	$T_A=25^\circ\text{C}$	I_{DM}	200	A
Avalanche Current		I_{AR}	32	A
Single Pulse Avalanche Energy ^{Note 4}		E_{AS}	50	mJ
Maximum Power Dissipation	$T_C=25^\circ\text{C}$	P_D	122	W
	$T_C=100^\circ\text{C}$		30.6	W
	$T_A=25^\circ\text{C}$		2.6	W
	$T_A=70^\circ\text{C}$		1.4	W
	Derate Factor Above $T_C=25^\circ\text{C}$		1.2	W/ $^\circ\text{C}$
Max. Operating Junction Temperature		T_J	125	$^\circ\text{C}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 125	$^\circ\text{C}$

2. Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-Case	$R_{\theta JC-N}$	Please refer to Note 5	-	-	0.8	$^\circ\text{C}/\text{W}$
Thermal resistance, Junction-Ambient	$R_{\theta JA-N}$	Please refer to Note 5	-	-	74.5	$^\circ\text{C}/\text{W}$

Notes:

- Limited by silicon chip capability and $R_{\theta JC-N}$ junction-to-case thermal resistance.
- The maximum current rating is limited by package and $R_{\theta JA-P}$ junction-to-ambient thermal resistance.
- Must be ensure junction temperature does not exceed 150-degree C. (Pulse Width $\leq 380\mu\text{s}$, Duty $\leq 2\%$)
- Limited by T_{Jmax} , starting $T_J=25^\circ\text{C}$, $L=0.1\text{mH}$, $R_g=25\Omega$, $I_D=32\text{A}$, $V_{GS}=10\text{V}$.
- The value of thermal resistance is measured with the single device put on cooling plate under a still air environment temperature is 25 degree C based on JEDEC standard JESD51-14 and JESD51-2a. Thermal resistance obtained depends on the user's specific board design and given application.

3. Electrical Characteristics (T_J=25°C unless otherwise noted)

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _{DS} =250μA	30	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V	-	-	1	μA
		V _{DS} =30V, V _{GS} =0V, T _J =125°C	-	-	100	μA
Gate-Body Leakage	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA

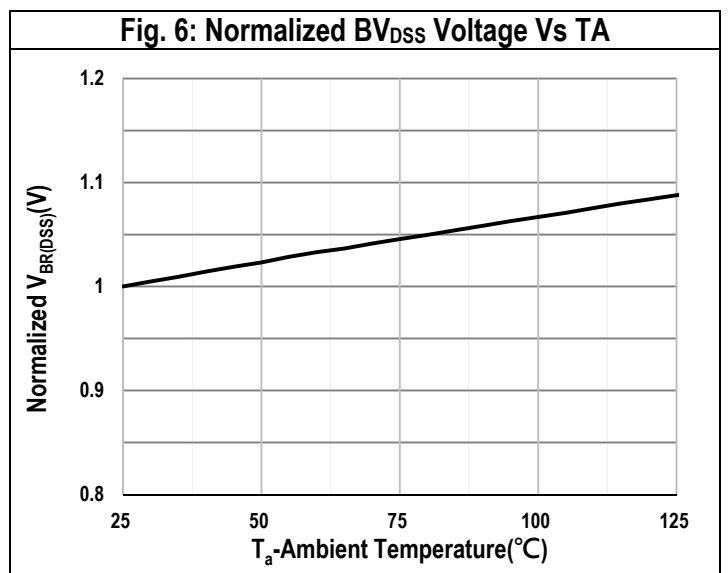
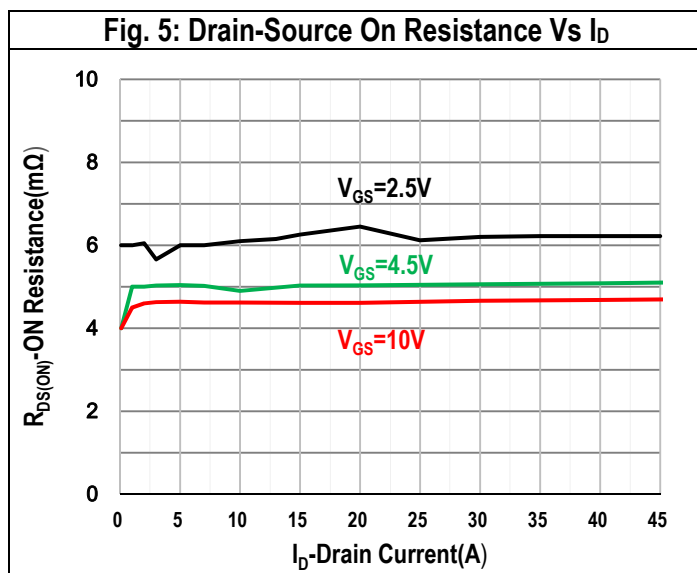
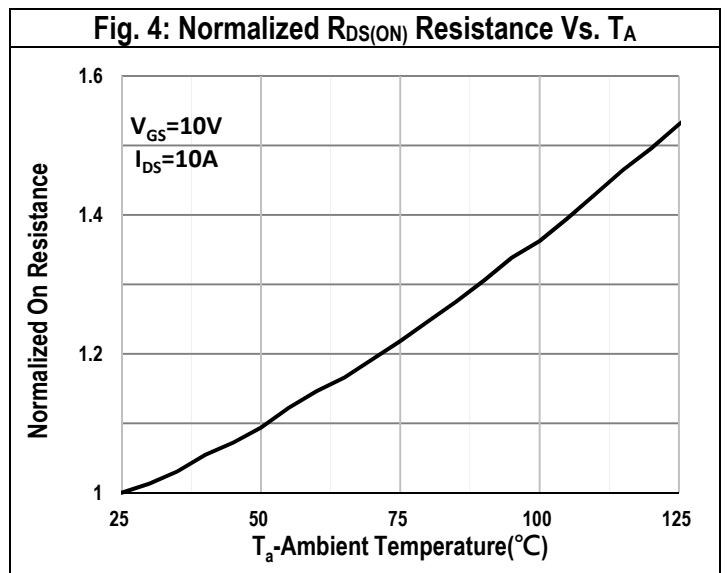
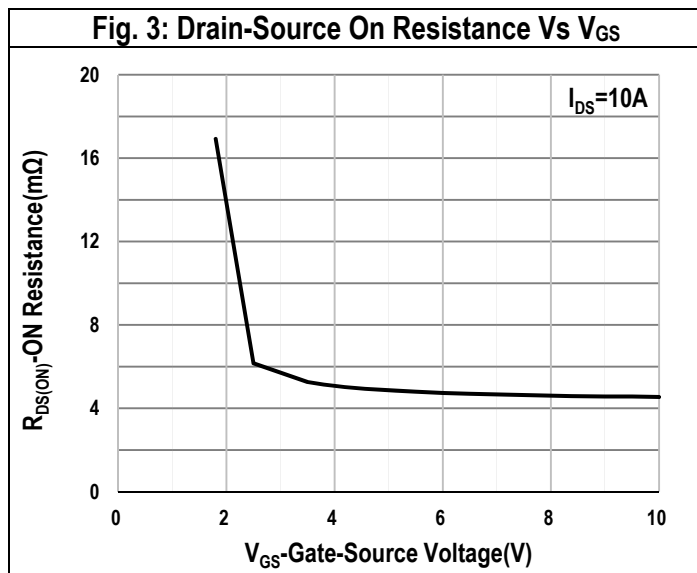
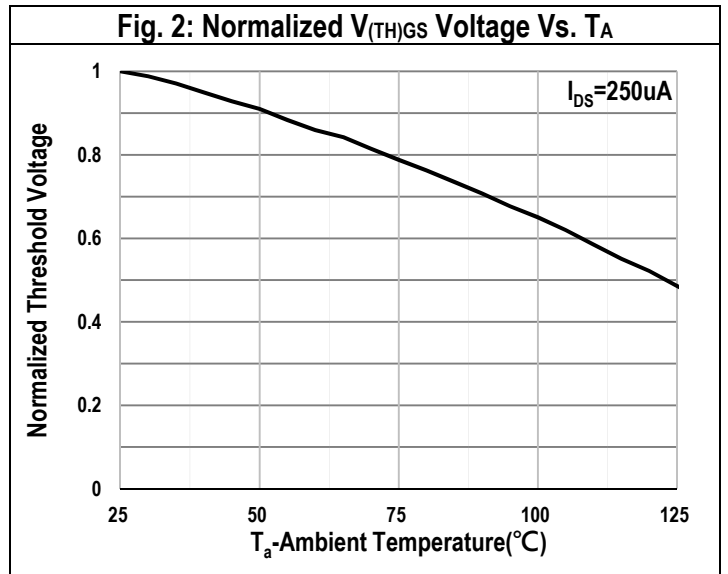
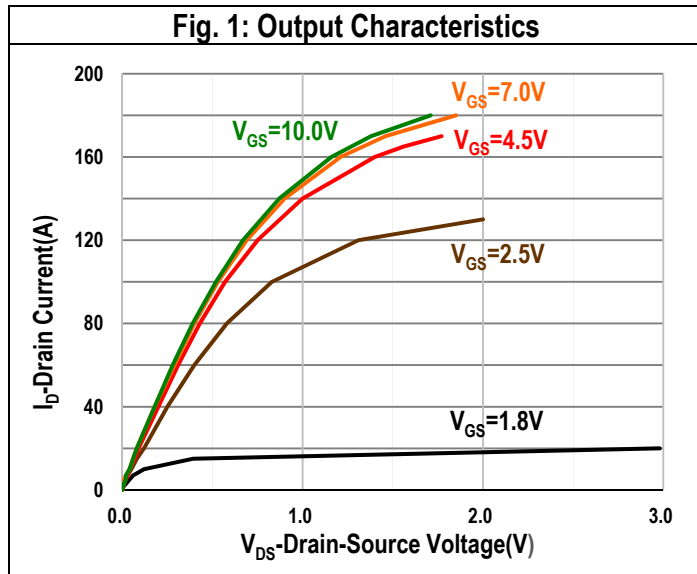
STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250μA	0.4	0.7	1	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _{DS} =20A	-	4.6	5.5	mΩ
		V _{GS} =4.5V, I _{DS} =10A	-	5.0	6.0	mΩ
		V _{GS} =2.5V, I _{DS} =8A	-	6.1	7.3	mΩ
Gate Resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	0.8	-	Ω
Forward Transconductance	g _{fs}	V _{DS} =5V, I _{DS} =5A	-	26.2	-	S

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C _{iss}	V _{DD} =30V, V _{DS} =15V, V _{GS} =0V, f=1MHz	-	3062	-	pF
Output Capacitance	C _{oss}	V _{DD} =30V, V _{DS} =15V, V _{GS} =0V, f=1MHz	-	300	-	pF
Reverse Transfer Capacitance	C _{rss}	V _{DD} =30V, V _{DS} =15V, V _{GS} =0V, f=1MHz	-	168	-	pF
Turn-On Delay Time	T _{d(on)}	V _{DS} =15V, V _{GS} =10V, I _{DS} =10A, R _{GEN} =3Ω	-	7.6	-	nS
Rise Time	T _r	V _{DS} =15V, V _{GS} =10V, I _{DS} =10A, R _{GEN} =3Ω	-	27.4	-	nS
Turn-Off Delay Time	T _{d(off)}	V _{DS} =15V, V _{GS} =10V, I _{DS} =10A, R _{GEN} =3Ω	-	64.3	-	nS
Fall Time	T _f	V _{DS} =15V, V _{GS} =10V, I _{DS} =10A, R _{GEN} =3Ω	-	56.3	-	nS

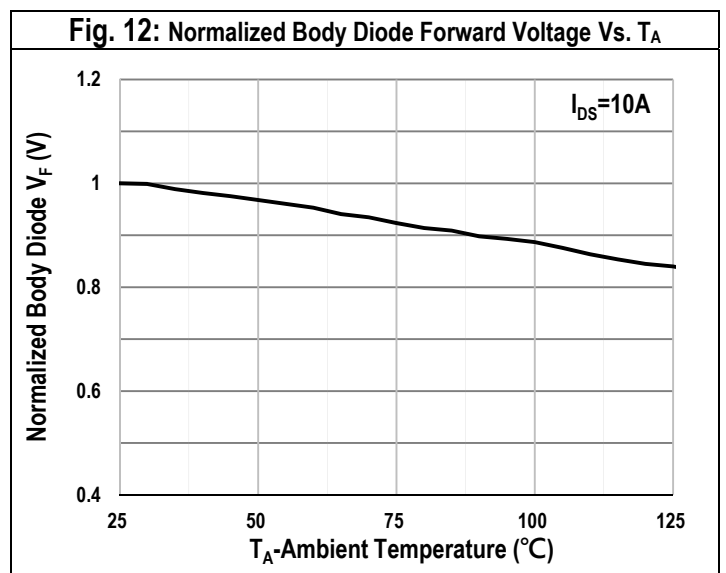
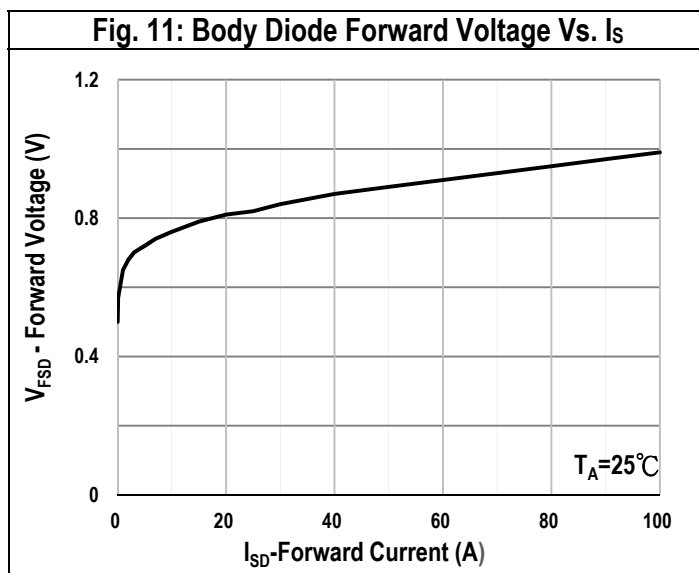
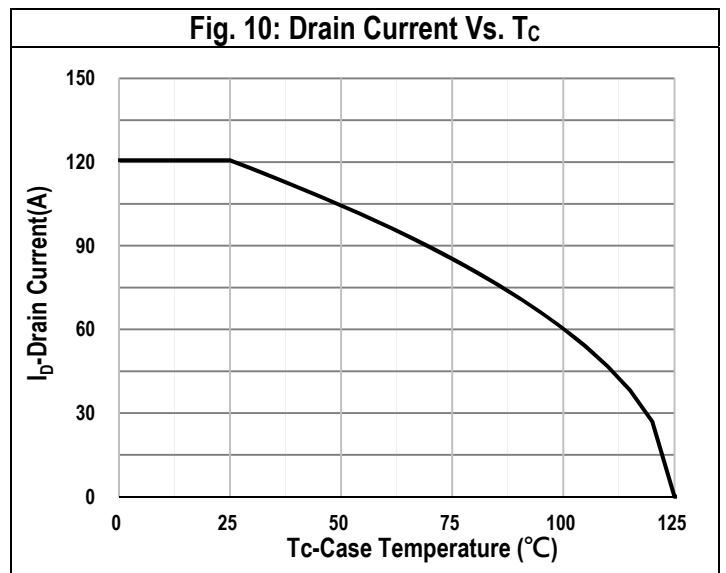
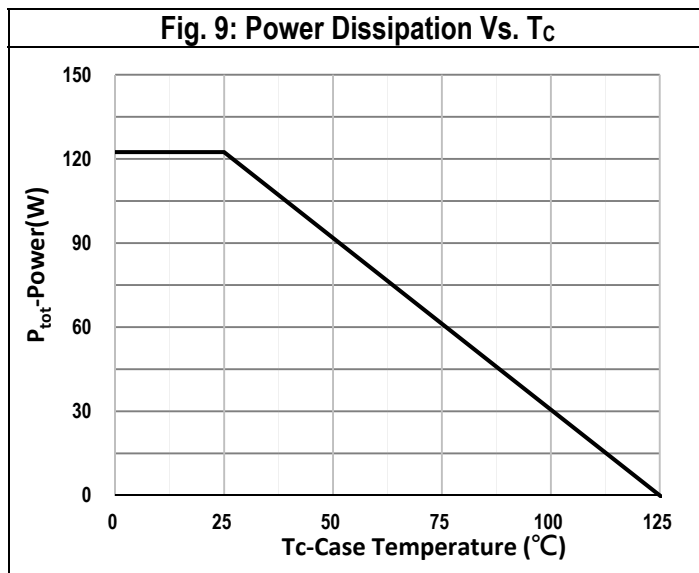
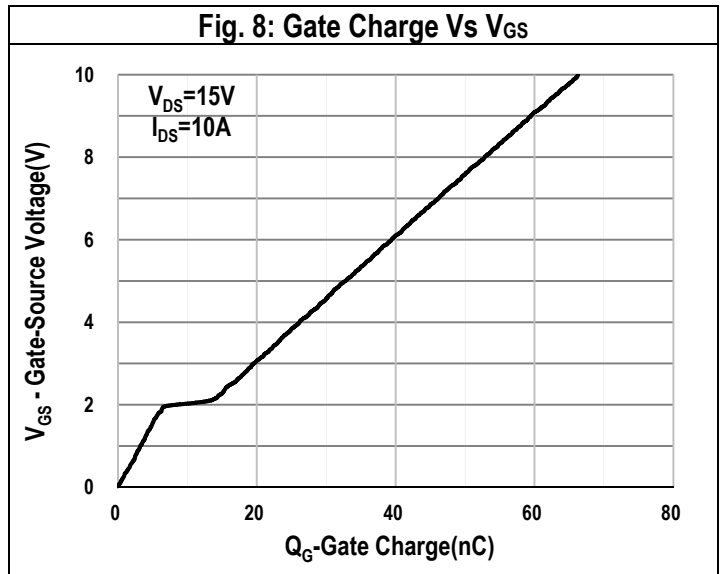
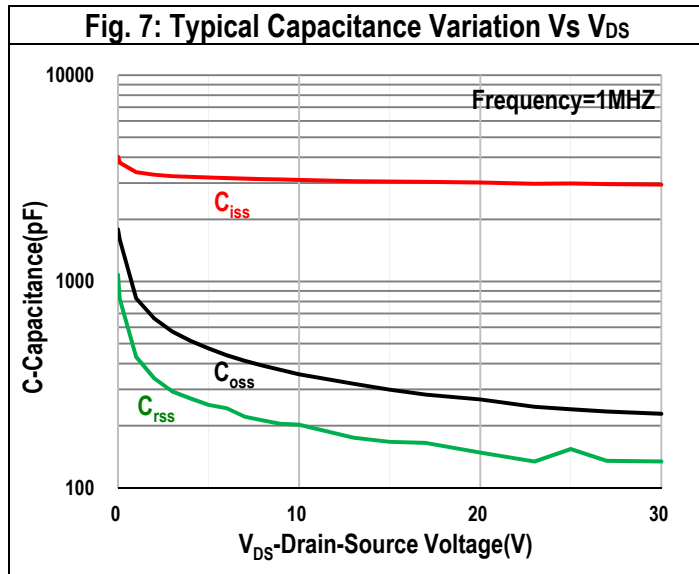
GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q _{gs}	V _{DD} =15V, I _D =10A, V _{GS} =0 to 10V	-	7.8	-	nC
Gate charge at threshold	Q _{g(th)}	V _{DD} =15V, I _D =10A, V _{GS} =0 to 10V	-	2.4	-	nC
Gate to Drain Charge	Q _{gd}	V _{DD} =15V, I _D =10A, V _{GS} =0 to 10V	-	6.0	-	nC
Switching charge	Q _{sw}	V _{DD} =15V, I _D =10A, V _{GS} =0 to 10V	-	11.4	-	nC
Gate charge total	Q _{g 10V}	V _{DD} =15V, I _D =10A, V _{GS} =0 to 10V	-	66.9	-	nC
Gate charge total	Q _{g 4.5V}	V _{DD} =15V, I _D =10A, V _{GS} =0 to 4.5V	-	16.6	-	nC
Gate plateau voltage	V _{plateau}	V _{DD} =15V, I _D =10A, V _{GS} =0 to 10V	-	2.0	-	V
Gate charge total, sync. FET (Q _g - Q _{gd})	Q _{g(sync)}	V _{DS} =0.1V, V _{GS} =0 to 10V	-	60.8	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Body Diode continuous forward current	I _S	T _C =25°C	-	-	120	A
Body Diode pulse current	I _{SM}	T _C =25°C	-	-	200	A
Body Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =10A	-	0.7	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	V _{DD} =15V, I _F =10A, di/dt=100A/μs	-	16	-	nS
		V _{DD} =15V, I _F =10A, di/dt=200A/μs	-	15.7	-	nC
Body Diode Reverse Recovery Charge	Q _{rr}	V _{DD} =15V, I _F =10A, di/dt=100A/μs	-	6.7	-	nS
		V _{DD} =15V, I _F =10A, di/dt=200A/μs	-	14.1	-	nC
Body Diode Reverse Recovery Current	I _{rm}	V _{DD} =15V, I _F =10A, di/dt=100A/μs	-	-0.8	-	A
		V _{DD} =15V, I _F =10A, di/dt=200A/μs	-	-1.6	-	A

4. Typical Operating Characteristics Diagram



4. Typical Operating Characteristics Diagram



4. Typical Operating Characteristics Diagram

Fig. 13: Safe Operation Area

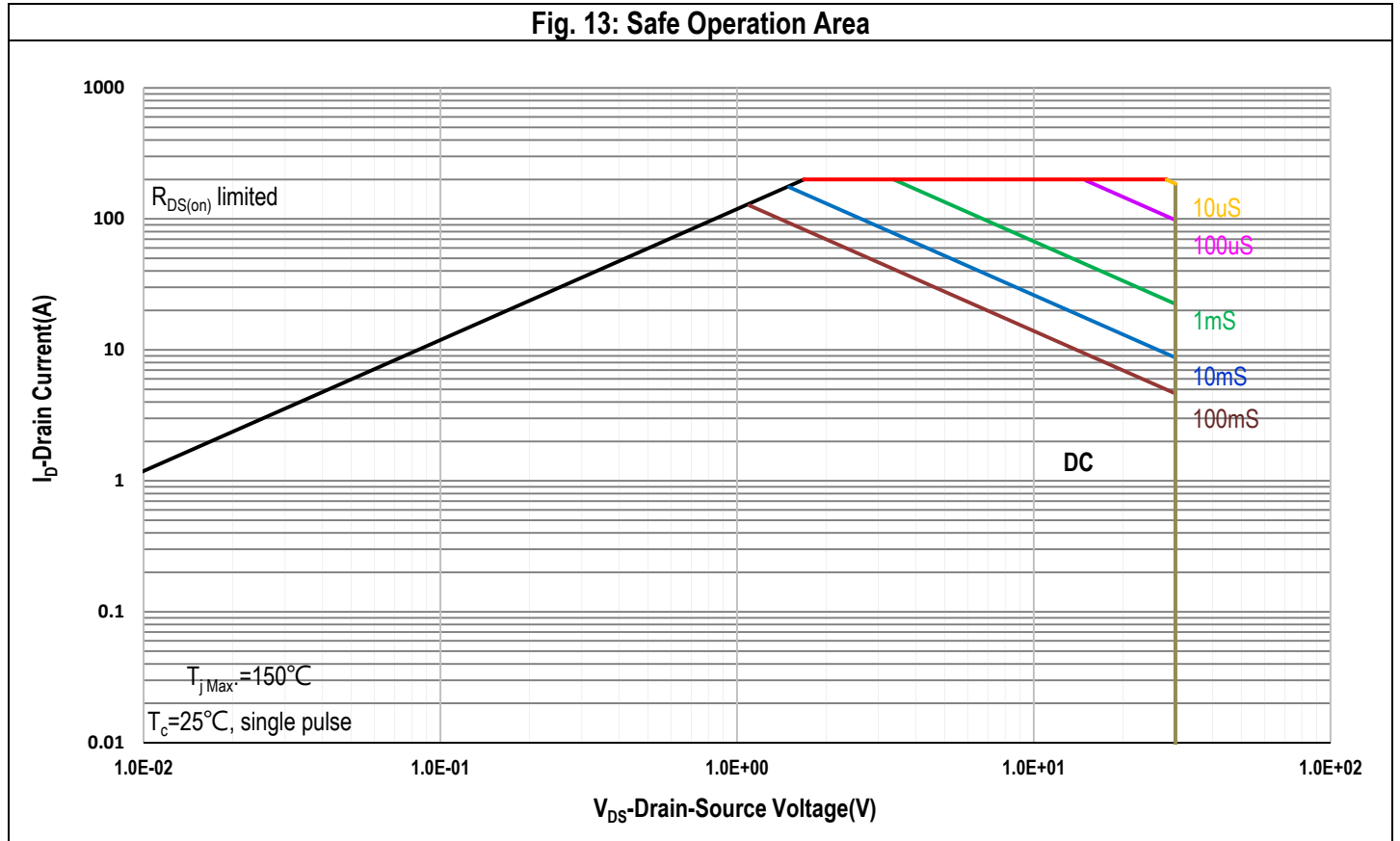
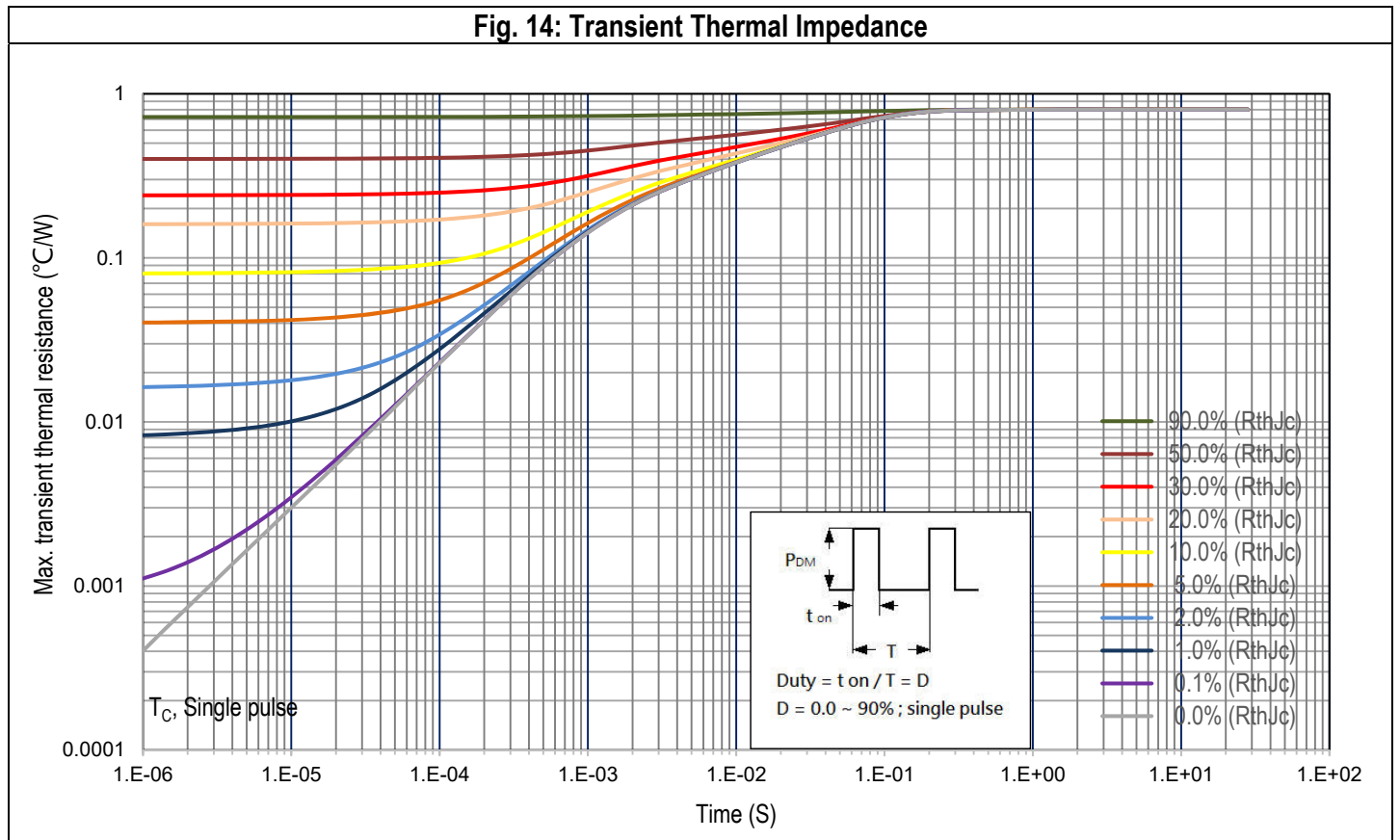
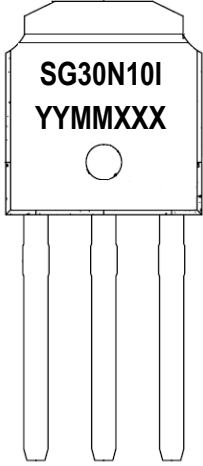


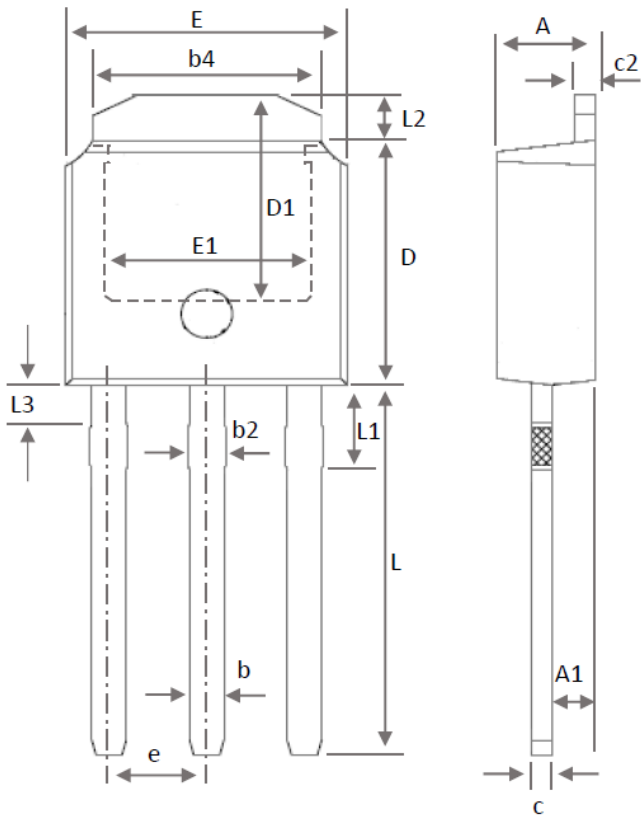
Fig. 14: Transient Thermal Impedance



5. Marking Information

TO-251AA (I)	Marking Rule
<p>Laser Marking</p>  <p>The diagram shows a TO-251AA MOSFET package. The top surface of the package is marked with the device identifier 'SG30N10I' and the date code 'YYMMXXX'. A small circle is located below the date code. The package has three leads extending downwards.</p>	<p><u>Line 1</u> : Device SG30N10I</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>

6. Package of Dimension



Symbol	Min	Nor	Max
A	2.20	2.30	2.38
A1	0.89	1.02	1.14
b	0.65	0.81	0.88
b2	0.95	1.05	1.14
b4	5.00	5.33	5.46
c	0.46	0.50	0.60
c2	0.46	-	0.70
D	6.00	6.10	6.20
D1	5.21	-	-
E	6.40	6.60	6.73
E1	4.32	-	-
e	2.29	2.29	2.29
L	9.00	9.20	9.40
L1	1.91	2.11	2.28
L2	1.00	1.15	1.27
L3	0.94	-	1.19



SG30N10I

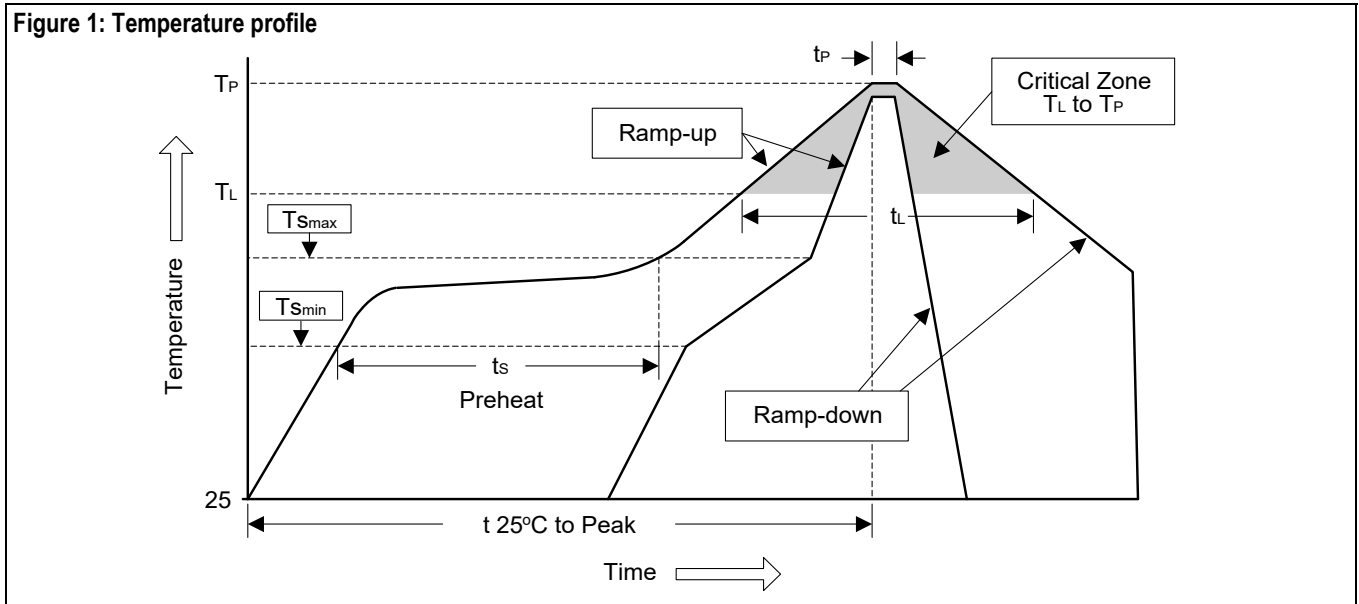
30V N Channel Enhanced Mode MOSFET

1. All dimension are in millimeters.
2. Dimension does not include burrs and mold flash/protrusions.

8. Appendix-A

Soldering Methods for Silicongear's Products (Just for SMD type of device)

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T _L to T _P)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T _{smin})	100°C	150°C
- Temperature Max (T _{smax})	150°C	200°C
- Time (min to max) (ts)	60 to 120 sec	60 to 180 sec
T _{smax} to T _L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T _L)	183°C	217°C
- Time (t _L)	60 to 150 sec	60 to 150 sec
Peak Temperature (T _P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t _P)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

8. Appendix-B**Important Notice****© Silicongear Corporation**

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9. Revision History

Document Revision History			
Device	Date	Revision	Description (major change from last revision)
SG30N10I	Aug-21-2024	01	<ul style="list-style-type: none">- First datasheet release- Sample Lot N.o: RNPJ7 ; Date Code: 2203910- Parameter definition based on verified raw data of R&D dept.- This device is not classified under general product development, and no any record or information