3.6mΩ, 100V, N-Channel Power MOSFET SRT10N042L

General Description

The Sanrise SRT10N042L uses advanced split gate trench technology. It has extremely low on resistance, low gate charge and fast switching time. This device is ideal for high frequency switching and synchronous rectification.

The SRT10N042L break down voltage is 100V and it has a high rugged avalanche characteristics.

The SRT10N042L is available in TO-220C package.

Symbol

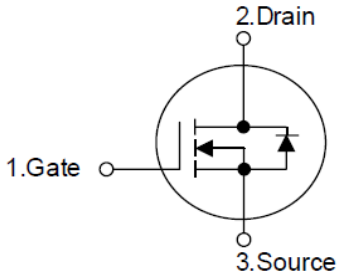

Figure 1 Symbol of SRT10N042L

Features

- BV_{DSS} = 100V, I_D = 135A
- Ultra Low $R_{DS(ON)\_TYP}$ = 3.6mΩ @ V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=90nC typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved Design
- 100% UIS Tested

Package Type

TO-220C

Figure 2 Package Type of SRT10N042L

Application

- Synchronous Rectification for Power Supply
- DC/DC Converters
- Moto-driver Application
- USB PD

Ordering Information

SRT10N042L□□–□

Circuit Type

Package
TC: TO-220C

E: Lead Free
G: Green

Blank: Tube
TR: Tape & Reel

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
TO-220C	SRT10N042LTC-E	SRT10N042LTC-G	SRT10N042LTCE	SRT10N042LTCG	Tube

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Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	T_C=25ºC	I_D	135	A
	T_C=100ºC		110	
Pulsed Drain Current (Note 3)		I_{DM}	400	A
Avalanche Current, Repetitive (Note 2)		I_{AR}	15	A
Avalanche Energy, Single Pulse (Note 2)		E_{AS}	450	mJ
VDS Spike (10us)		V_{SPIKE}	120	V
Operating Junction Temperature		T_J	150	ºC
Storage Temperature		T_{STG}	-55 ~ 150	ºC
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	ºC

Note:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. I_{AS} = 15A, V_{DD} = 50V, L=3mH, R_G = 25Ω, Starting T_J = 25°C
3. Repetitive Rating: Pulse width limited by maximum junction temperature

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance，Junction-to-Case	R_{thJC}	-		0.7	ºC/W
Thermal Resistance，Junction-to-Ambient	R_{thJA}	-		60	

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Electrical Characteristics

T_J = 25ºC, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250uA	100			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-100	nA
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	1.2	1.9	2.5	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=67A		3.8	4.2	mΩ
			V_{GS}=4.5V, I_D=35A		4.5	5.5	
Forward Transconductance		g_{FS}	V_{DS}=5V, I_D=55A	60			S
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1MHz		6838		pF
Output Capacitance		C_{OSS}			1073		
Reverse Transfer Capacitance		C_{RSS}			38		
Gate Resistance		R_G	f=1MHz, Open Drain		5		Ω
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=50V, I_D=20A R_G=4.7Ω, V_{GS}=10V		70		ns
Rise Time		t_r			93		
Turn-off Delay Time		$t_{d(off)}$			188		
Fall Time		t_f			53		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=50V, I_D=20A V_{GS}=0 to 10V		25		nC
Gate to Drain Charge		Q_{gd}			14		
Gate Charge Total		Q_g			90		
Gate Plateau Voltage		$V_{plateau}$			3.5		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=67A		0.82	1.2	V
Reverse Recovery Time		t_{rr}	V_R=50V, I_F=20A dI$_F$/dt=100A/us		64		ns
Reverse Recovery Charge		Q_{rr}			123		nC
Peak Reverse Recovery Current		I_{rrm}			3.2		A

Typical Performance Characteristics

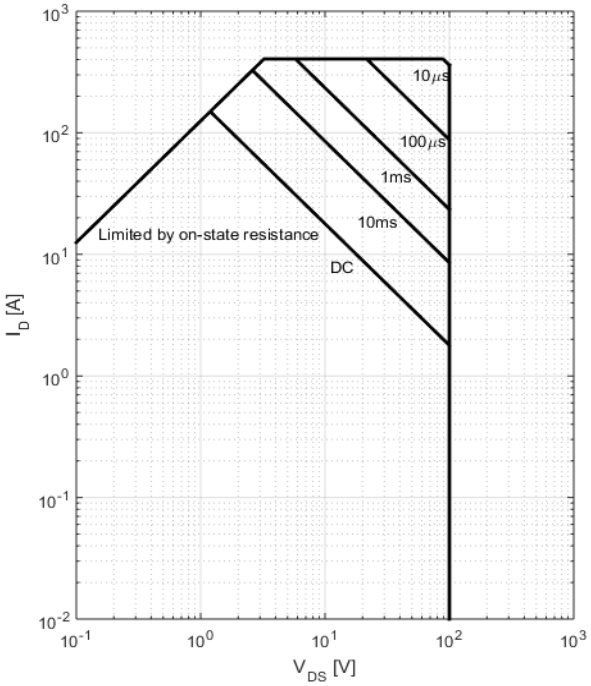
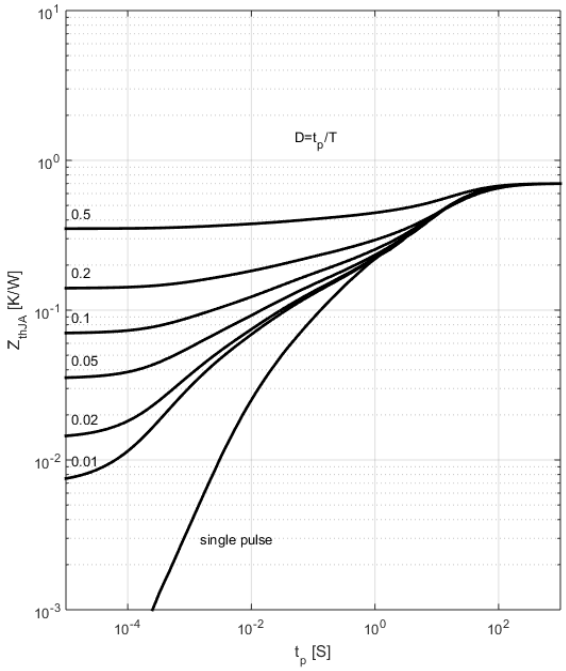
Figure 1: Max. Forward Safe Operating Area	Figure 2: Max. Transient Thermal Impedance
	
I_D=f(V_{DS}); Tc=25℃; V_{GS}＞7.0V；parameter t_p	Z($_{thJC}$) = f(t_p); parameter: D = t_p/T

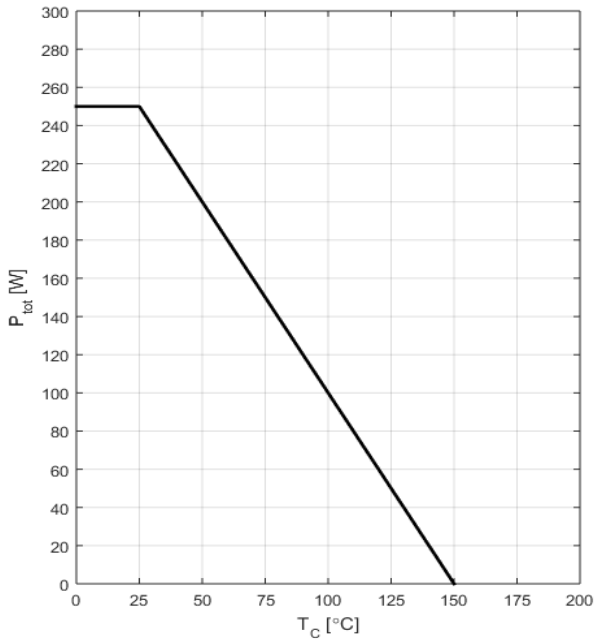
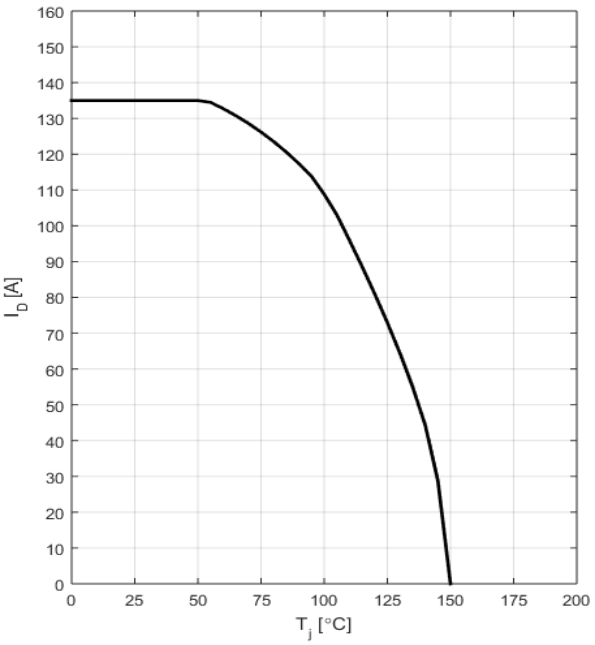
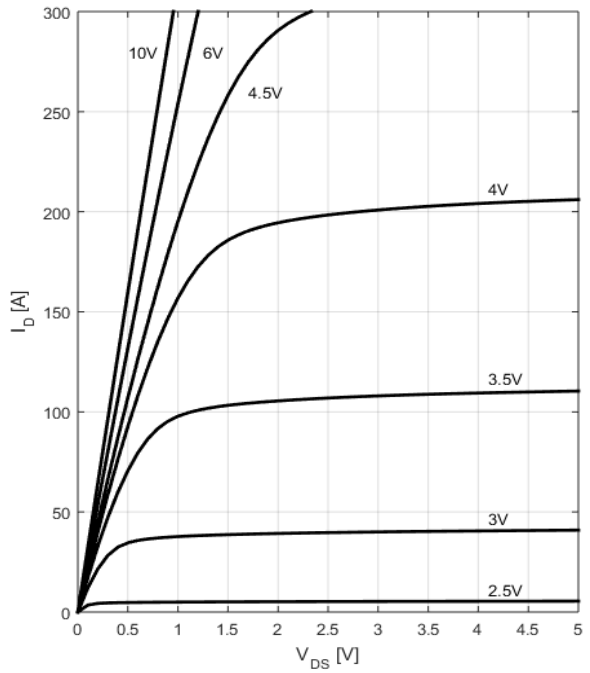
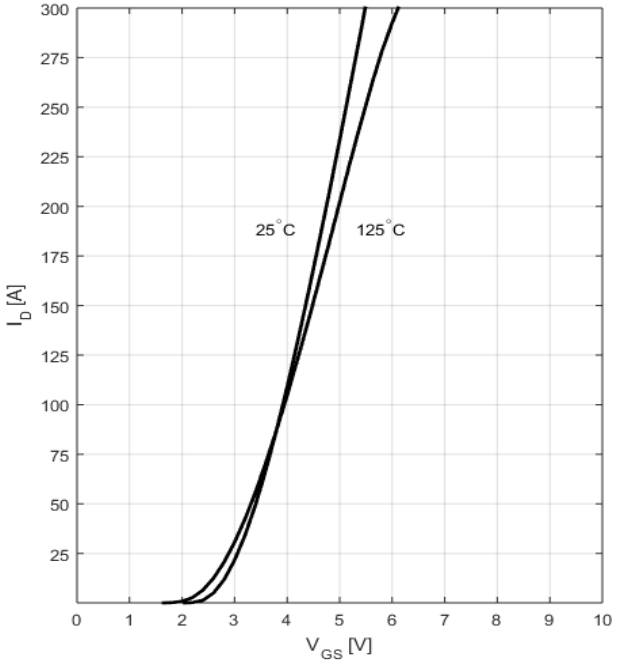
Figure 3: Power Dissipation	Figure 4: Drain Current vs. Temperature
	
Ptot=f(T_C)	I_D = f(T_J); V_{GS}>=10V

Figure 5: Typ. Output Characteristics



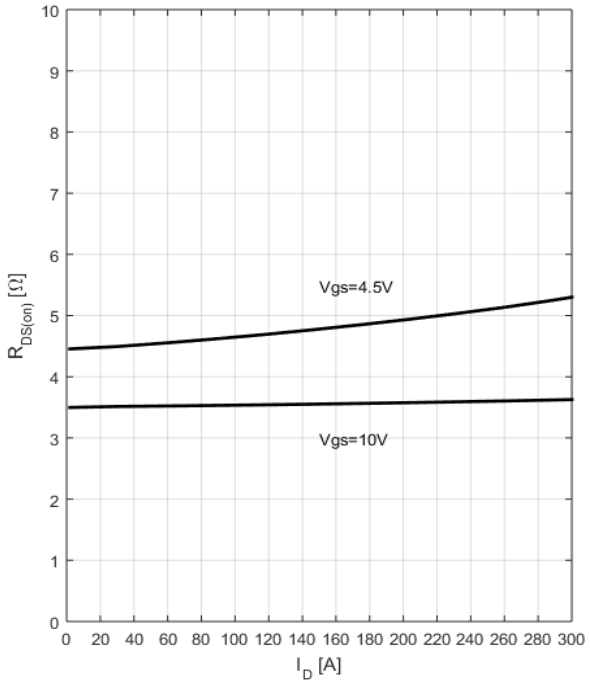
$I_D = f(V_{DS})$; Tj= 25ºC; parameter: V_{GS}

Figure 6: Typ. Transfer Characteristics



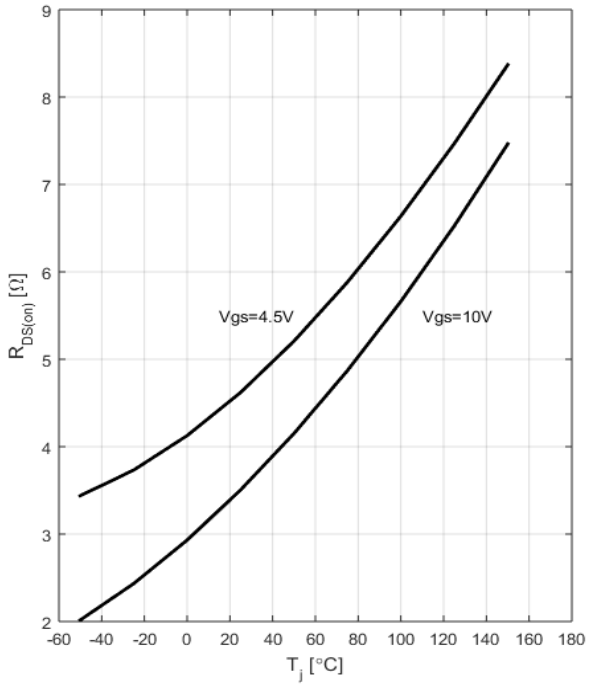
$I_D = f(V_{GS})$; V_{DS}=5V

Figure 7: Typ. Drain-Source On-State Resistance



$R_{DS(ON)} = f(I_D)$; T_j=25ºC; parameter: V_{GS}

Figure 8: Typ. Drain-Source On-State Resistance



$R_{DS(ON)}=f(T_j)$; I_D=67A; V_{GS}=10V

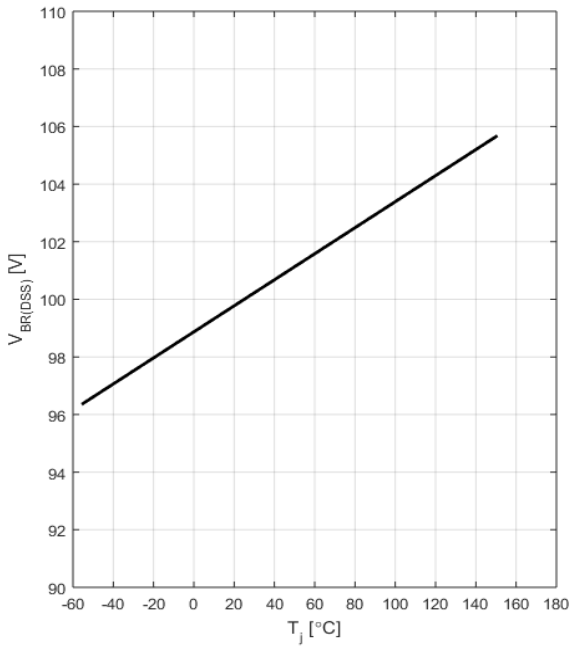
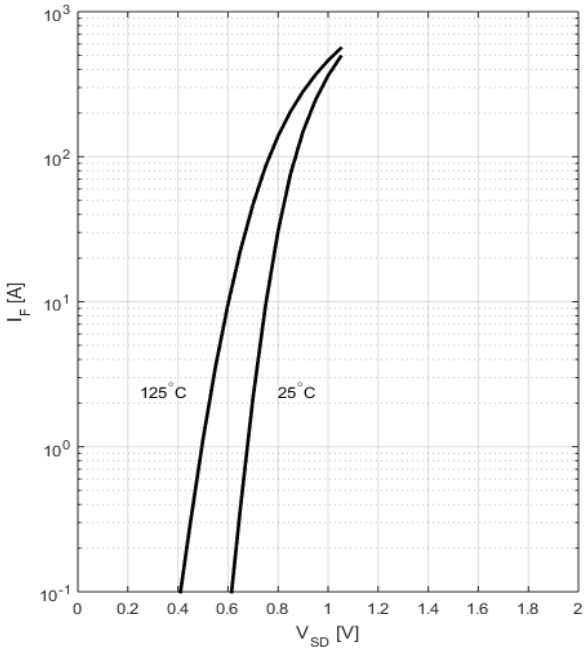
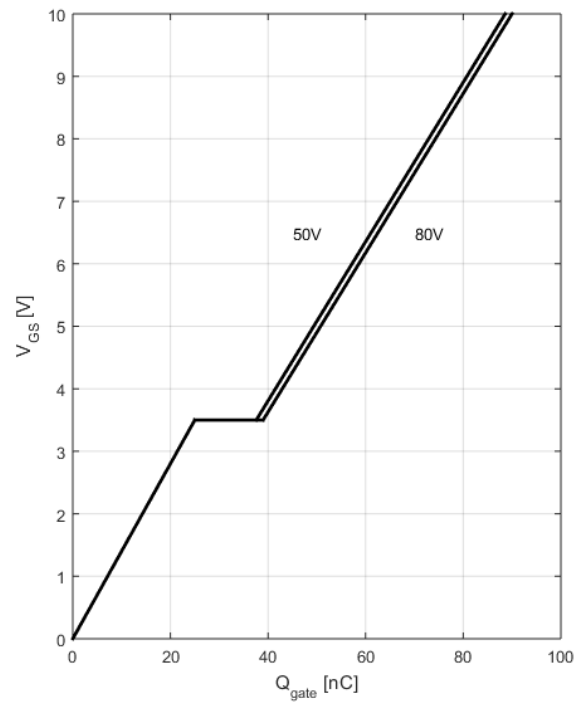
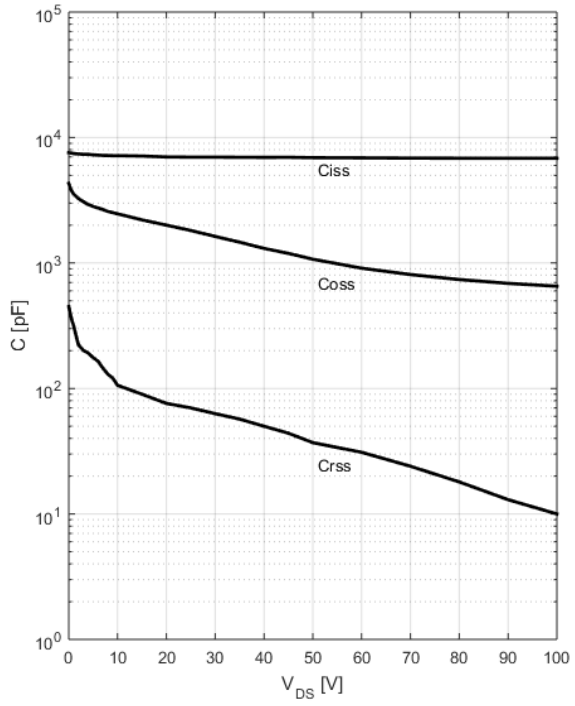
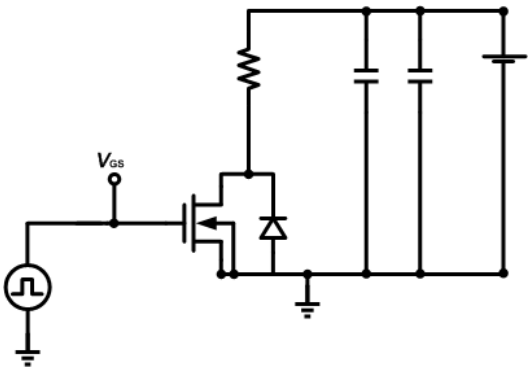
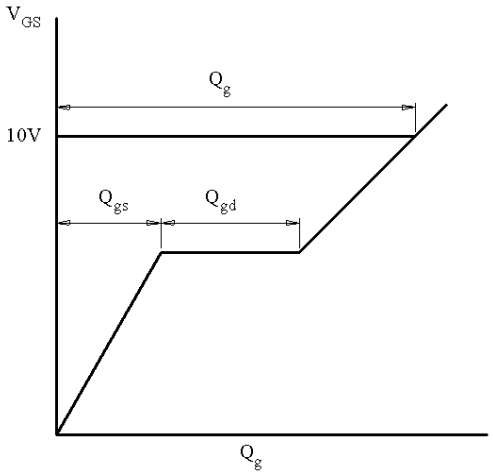
Figure 9: Drain-Source Breakdown Voltage	Figure 10: Forward Characteristics of Reverse Diode
	
$V_{BR(DSS)}$=f(T_j); I_D=1mA	I_F=f(V_{SD}); parameter: T_j

Figure 11: Typ. Gate Charge	Figure 12: Typ. Capacitances
	
V_{GS}= f(Q_{gate}), I_D= 20A pulsed	C=f(V_{DS}); V_{GS}=0; f=1MHz

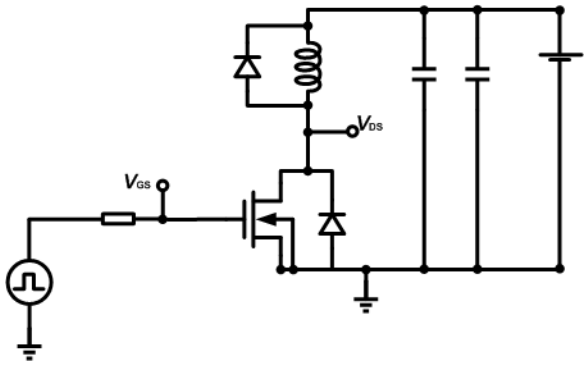
Test Circuits

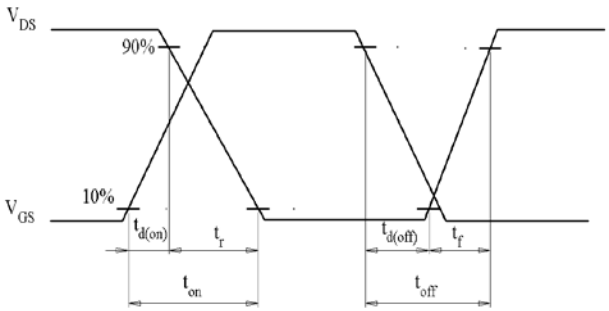
1. Gate Charge Test Circuit & Waveform



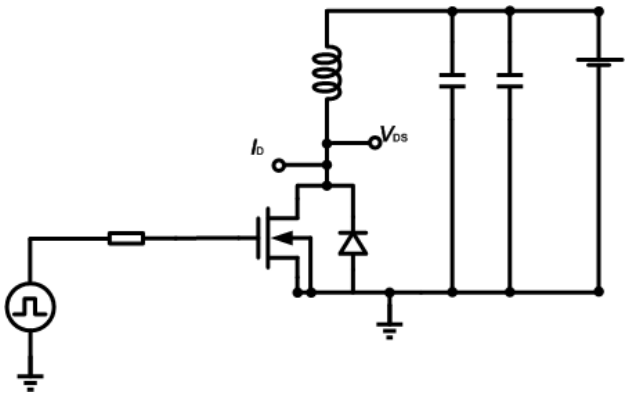


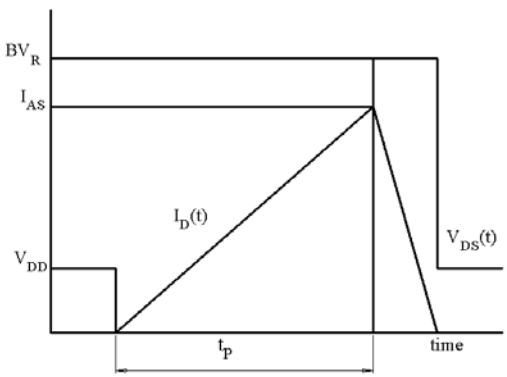
2. Switch Time Test Circuit



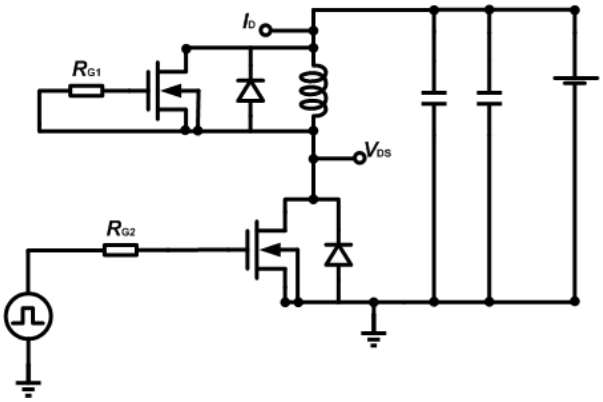


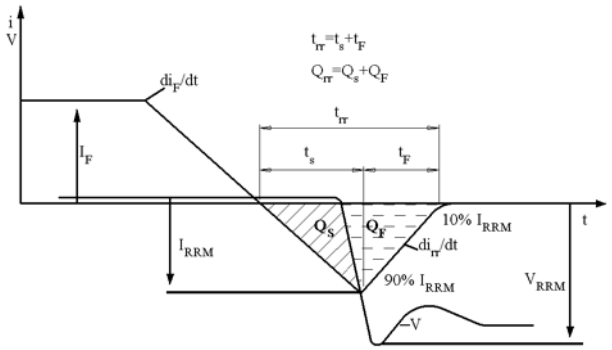
3. Unclaimed Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics





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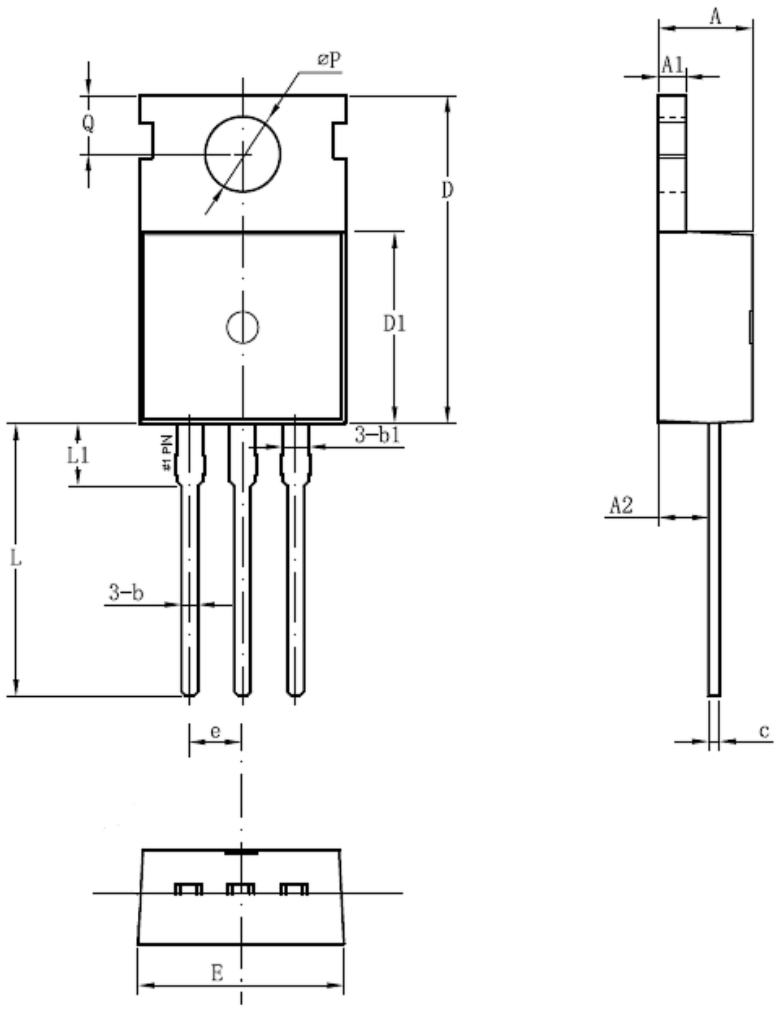
Mechanical Dimensions

TO-220C **Unit: mm**



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.50	4.70
A1	1.20	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b1	-	1.27	-
c	0.40	0.50	0.65
D	15.20	15.70	16.20
D1	9.00	9.20	9.40
E	9.70	10.00	10.20
e	2.54(BSC)		
L	12.60	13.08	13.60
L1	-	3.00	-
ΦP	3.50	3.60	3.80
Q	2.60	2.80	3.00

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Sanrise Technology Limited Company

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Main Site:

- Headquarter

Sanrise Technology Limited Company

Rm.601~603, Building B, SDG Information Port, No.2, Kefeng Road, Science & Technology Park, Nanshan District, ShenZhen, China

Tel: +86-755-22953335

Fax: +86-755-22916878

- Shanghai Office

Sanrise Technology Limited Company

No. 1159, Cailun Road, Zhangjiang HiTech Park, Pudong District, Shanghai, China

Tel: +86-21-51355061