0.7mΩ, 40V, N-Channel Power MOSFET SRT04N007HC

General Description

The Sanrise SRT04N007HC is a low voltage power MOSFET, fabricated using advanced split gate trench technology. The resulting device has extremely low on resistance, low gate charge and fast switching time, making it especially suitable for applications which require superior power density and synchronous rectification.

The SRT04N007HC break down voltage is 40V and it has a high rugged avalanche characteristics.

The SRT04N007HC is available in PDFN5*6 package.

Features

- Ultra Low $R_{DS(ON)_TYP}$ = 0.59mΩ @V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=100nC typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Non-automotive Qualified

Application

- Server/Telecom
- DC/DC Converter
- High Power Supply
- E-Tools
- BMS

Symbol

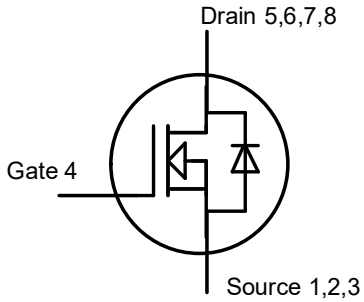
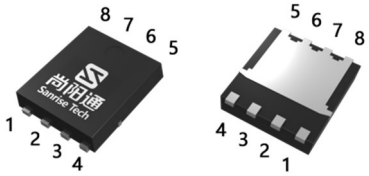


Figure 1 Symbol of SRT04N007HC

Package Type



PDFN5*6

Figure 2 Package Type of SRT04N007HC

Ordering Information

SRT04N007HC□□–□

Circuit Type

Package

C56: PDFN5*6 Clip

E: Lead Free

G: Green

Blank: Tube

TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
PDFN5*6	SRT04N007HC56TR-G	SRT04N007HC56G	Tape & Reel

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Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, Silicon	T_C=25ºC	I_D	390	A
	T_C=100ºC		276	
Pulsed Drain Current (Note 3)		I_{DM}	1560	A
Power Dissipation (T_C = 25°C)		P_D	183	W
Avalanche Destructive Energy, Single Pulse (Note 5)		E_{AS_Limit}	729	mJ
Avalanche Energy, Single Pulse (Note 4)		E_{AS}	225	mJ
Continuous Diode Forward Current		I_S	390	A
Diode Pulse Current		$I_{S.PULSE}$	1560	A
Operating Junction Temperature		T_J	175	ºC
Storage Temperature		T_{STG}	-55 to 175	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. Current Limited by Package.
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. I_{AS}= 30.0A, V_{DD}= 30V, R_G= 25Ω, Starting T_J= 25°C
5. I_{AS_Limit}= 54.0A, V_{DD}= 30V, R_G= 25Ω, Starting T_J= 25°C

Thermal Resistance

Parameter		Symbol	Min	Typ	Max	Unit
Thermal Resistance，Junction-to-Case	PDFN5*6	R_{thJC}			0.82	ºC/W
Thermal Resistance，Junction-to-Ambient	PDFN5*6	R_{thJA}			50	

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Electrical Characteristics

T_J = 25℃, 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	40			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=40V, 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	
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=0.25mA	2.0	3.0	4.0	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=60A		0.59	0.7	mΩ
Gate Resistance		R_G	f=1MHz, Open Drain		1.7		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=20V, V_{GS}=0V, f=1MHz		7000		pF
Output Capacitance		C_{OSS}			3000		pF
Reverse Transfer Capacitance		C_{RSS}			70		pF
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=20V, I_D=60A R_G=1.6Ω, V_{GS}=10V		21		ns
Rise Time		t_r			7		
Turn-off Delay Time		$t_{d(off)}$			25		
Fall Time		t_f			10		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=20V, I_D=60A V_{GS}=0 to 10V		30		nC
Gate to Drain Charge		Q_{gd}			18		
Gate Charge Total		Q_g			100		
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=60A		0.8	1.1	V
Reverse Recovery Time		t_{rr}	V_R=20V, I_F=20A dI$_F$/dt=100A/us		60		ns
Reverse Recovery Charge		Q_{rr}			58		nC

Typical Performance Characteristics

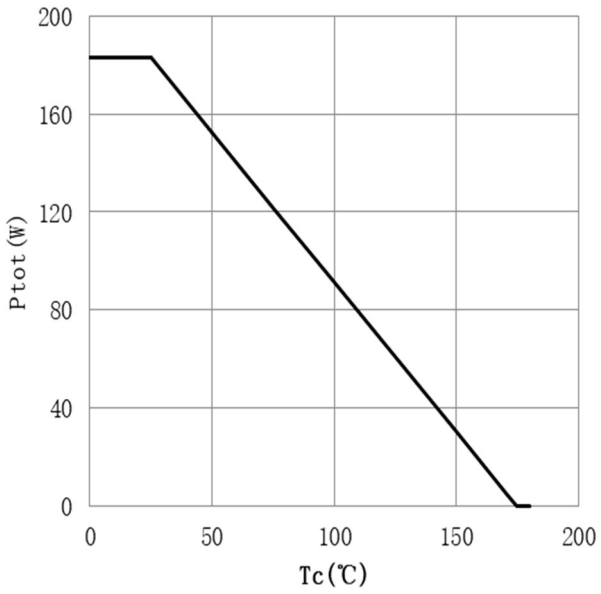
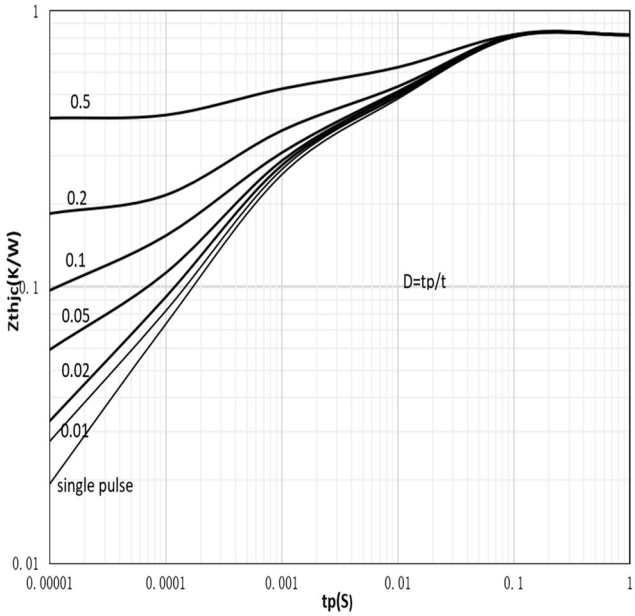
Figure 3: Power Dissipation	Figure 4: Max. Transient Thermal Impedance
	
$P_{tot}=f(T_c)$	$Z_{(thJC)}=f(t_p)$; parameter: $D=t_p/T$

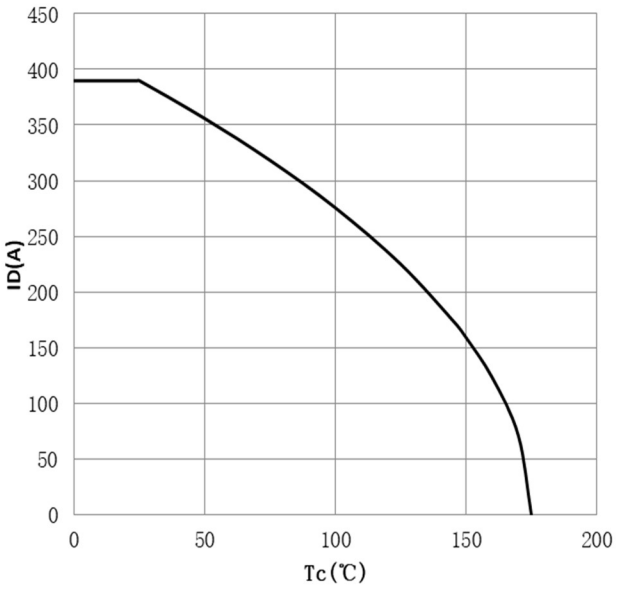
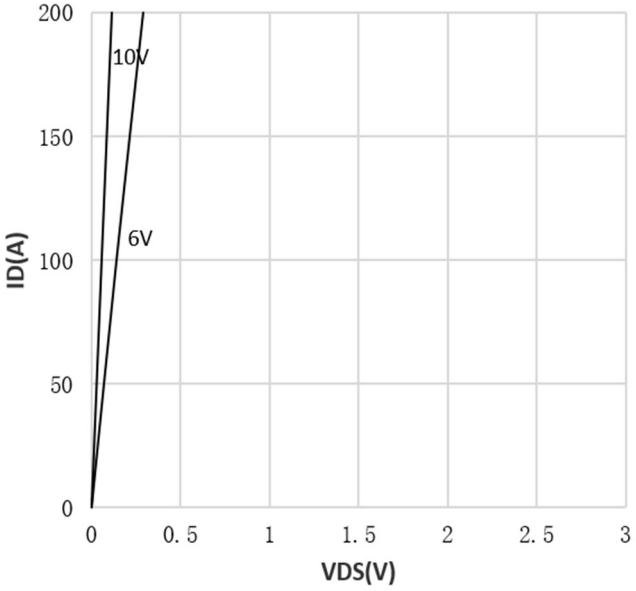
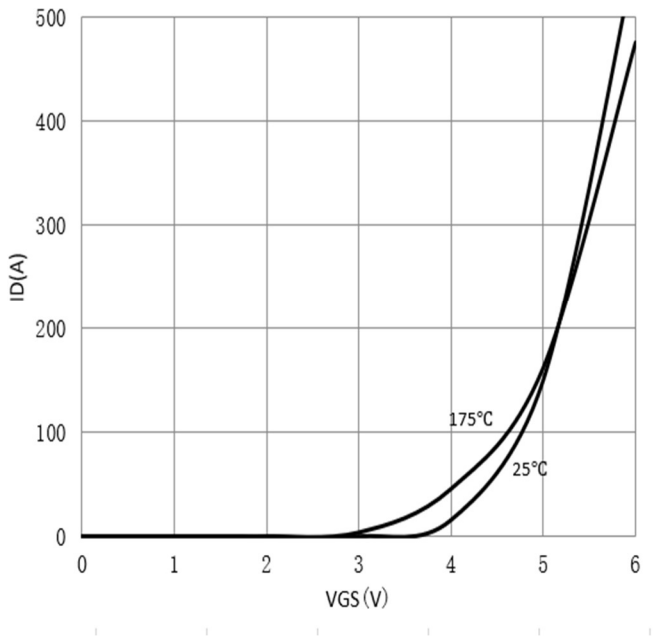
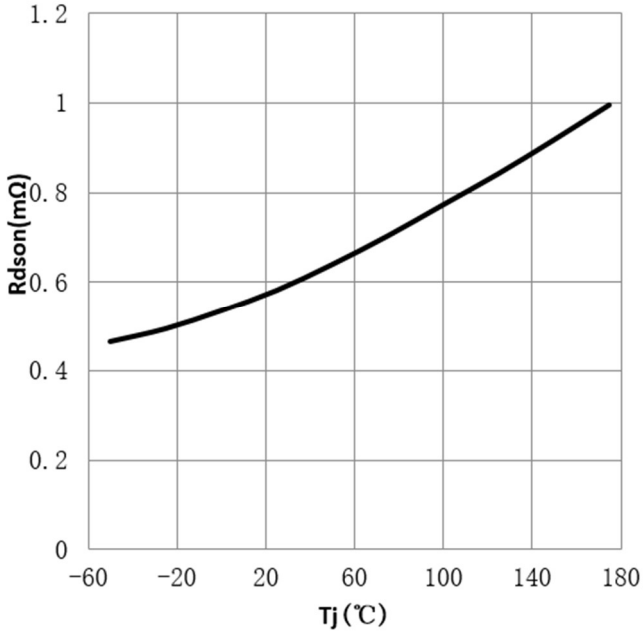
Figure5: Drain Current	Figure6: Typ. Output Characteristics
	
$I_D=f(T_C)$;$V_{GS}\geq10V$	$I_D=f(V_{DS})$;Tj=25ºC; parameter: V_{GS}

Figure7: Typ. Transfer Characteristics



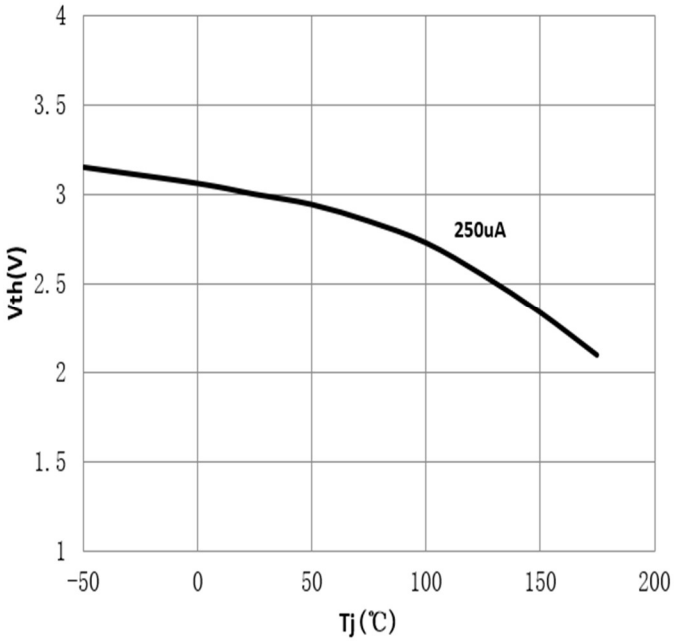
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: T_j

Figure8: Typ. Drain-Source On-State Resistance



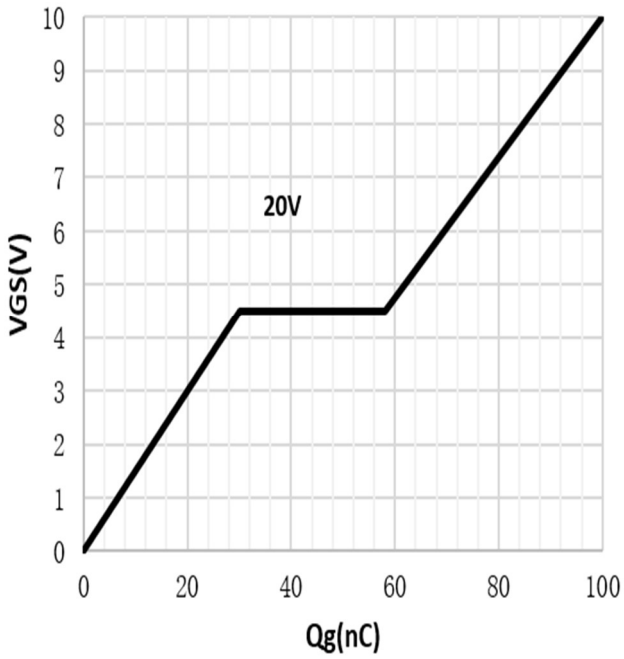
$R_{DS(ON)}=f(T_j)$;I_D=60A;V_{GS}=10V

Figure9: Typ. Gate Threshold Voltage



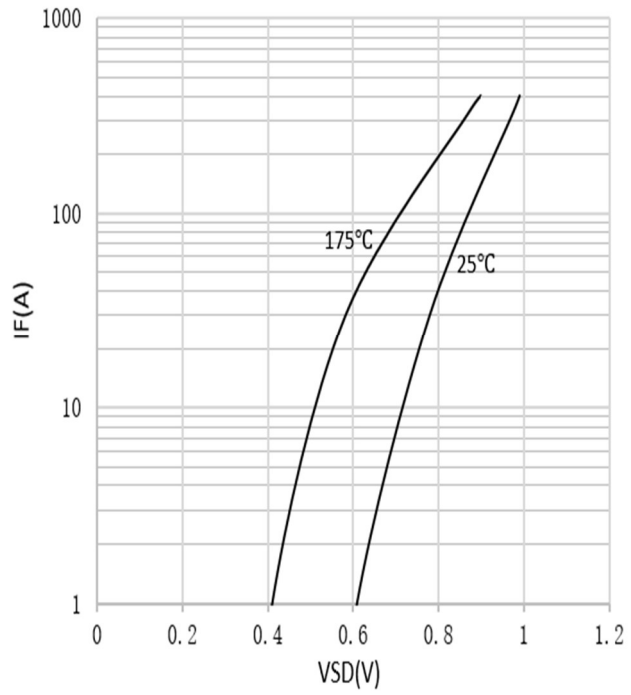
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; I_{DS}=250μA

Figure 10: Typ. Gate Charge



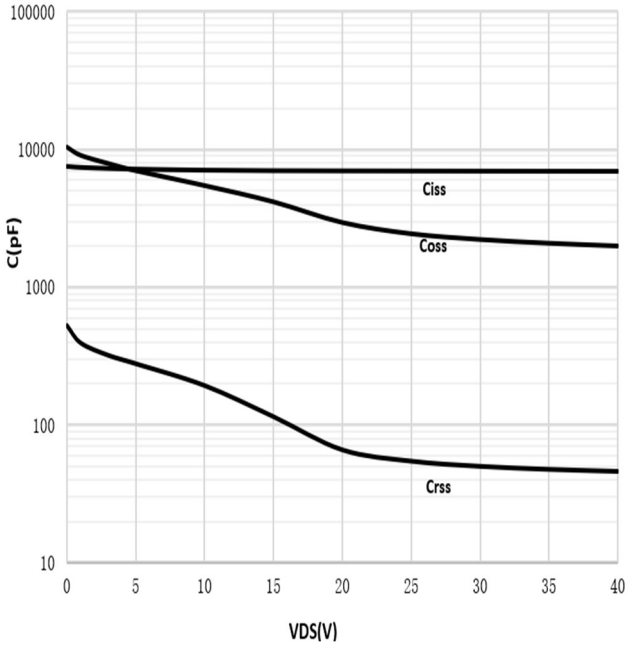
V_{GS}= f(Q_{gate}), I_D=60A pulsed

Figure 11: Forward Characteristics of Reverse Diode



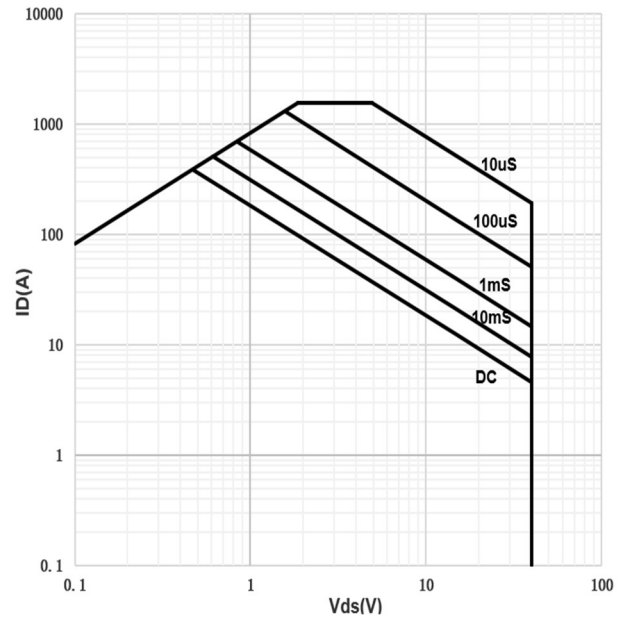
$I_F=f(V_{SD})$; parameter: T_j

Figure 12: Typ. Capacitances



$C=f(V_{DS})$; $V_{GS}=0$; f=1MHz

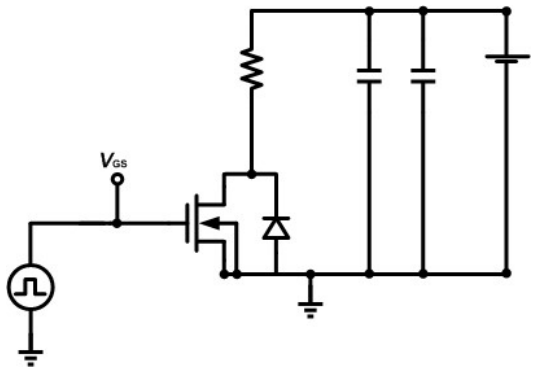
Figure 13: Safe Operating Area

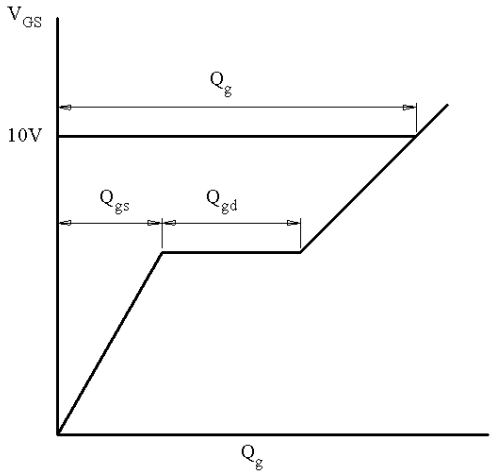


$I_D = f(V_{DS})$; T_c= 25ºC; V_{GS}>7V; parameter t_p

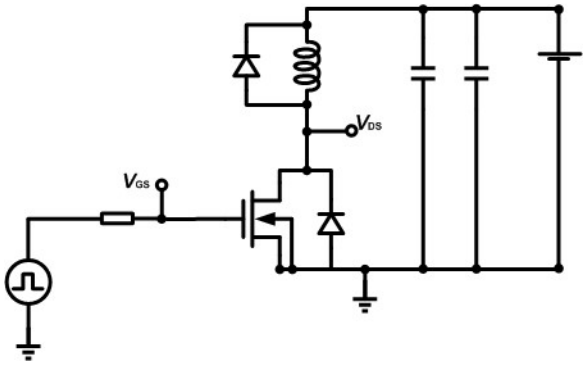
Test Circuits

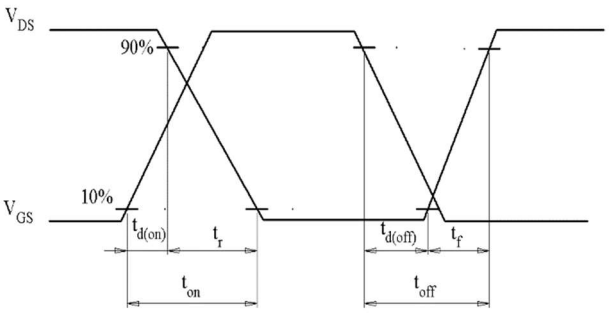
1. Gate Charge Test Circuit & Waveform



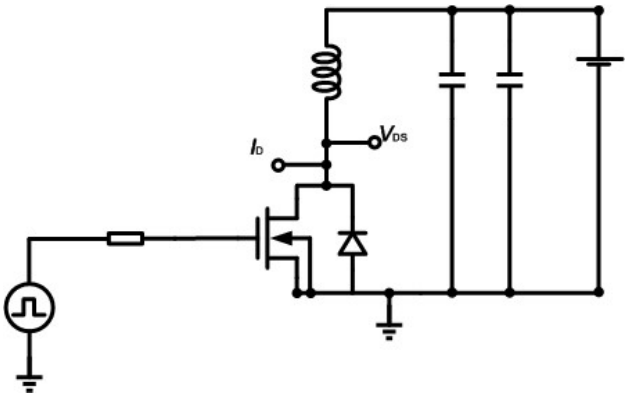


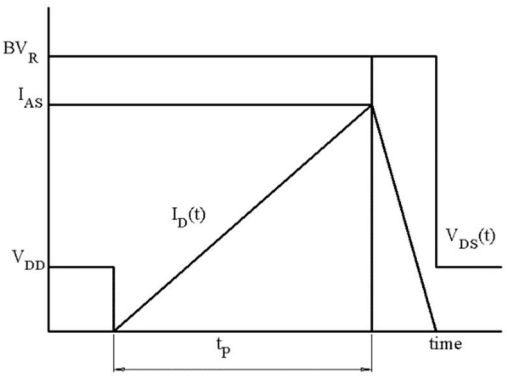
2. Switch Time Test Circuit



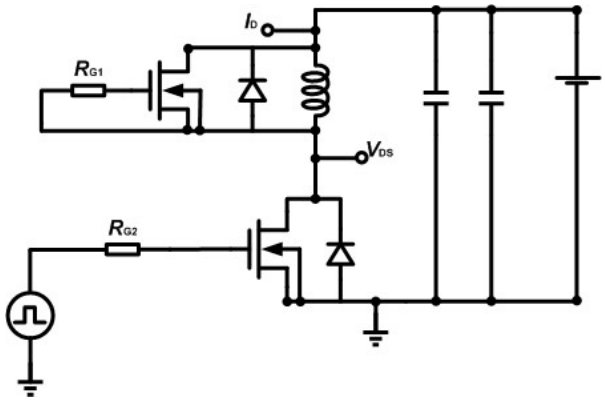


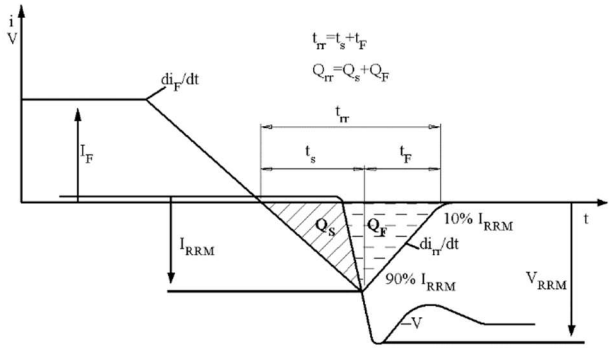
3. Unclamped Inductive Switching Test Circuit & Waveforms





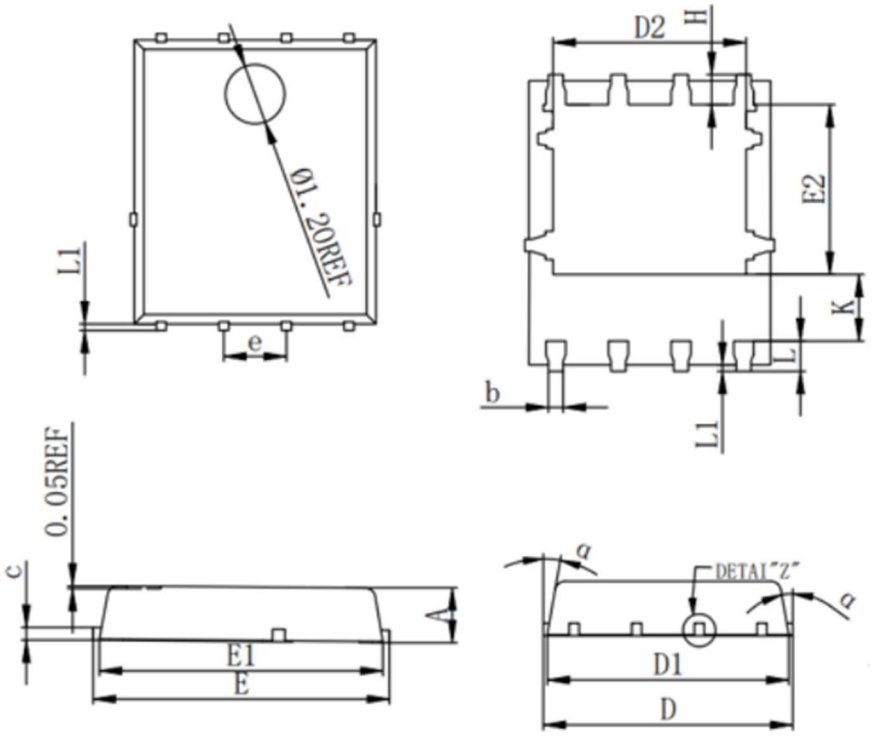
4. Test Circuit and Waveform for Diode Characteristics





Mechanical Dimension

PDFN5*6-8 **Unit: mm**



DIM	MILLIMETERS	
	MIN	MAX
A	0.90	1.20
b	0.30	0.50
c	0.15	0.35
D	4.94	5.35
D1	4.80	5.45
D2	3.82	4.40
e	1.17	1.37
E	5.90	6.35
E1	5.65	6.06
E2	3.34	3.92
H	0.35	0.75
K	1.10	1.50
L	0.30	0.75
L1	0.05	0.25
α	8°	13°

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Sanrise Technology Limited Company

http://www.sanrise-tech.com

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