

General Description

The Sanrise SRT15N090H 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 SRT15N090H break down voltage is 150V and it has a high rugged avalanche characteristics. The SRT15N090H is available in TO-220C and TO-263-2 and PDFN5*6 packages.

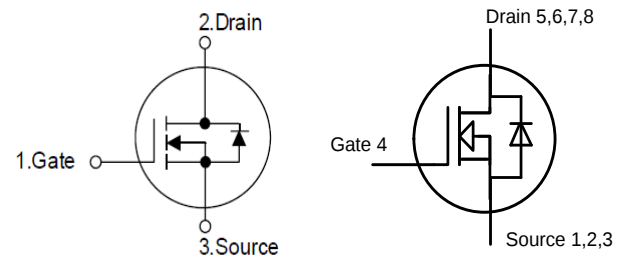
Features

- Ultra Low
 $R_{DS(ON_TYP)} = 7.3m\Omega$, TO-220C @ $V_{GS} = 10V$.
 $R_{DS(ON_TYP)} = 7.2m\Omega$, TO-263-2@ $V_{GS} = 10V$.
 $R_{DS(ON_TYP)} = 7.2m\Omega$, PDFN5*6 @ $V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g=32nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Non-automotive Qualified

Application

- Server/Telecom
- High Power Supply
- Solar
- UPS

Symbol

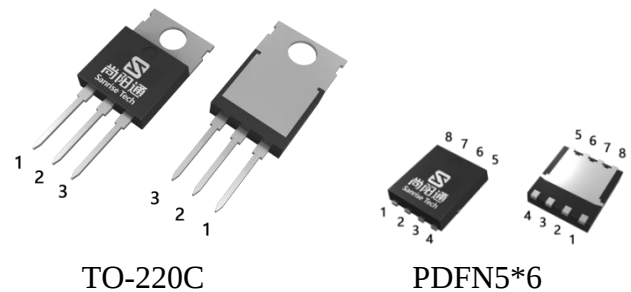


TO-220C, TO-263-2

PDFN5*6

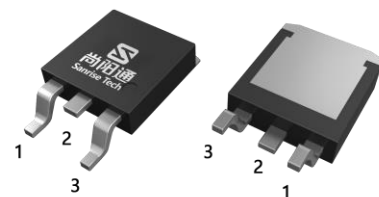
Figure 1 Symbol of SRT15N090H

Package Type



TO-220C

PDFN5*6



TO-263-2

Figure 2 Package Type of SRT15N090H

9.0mΩ, 150V, N-Channel Power MOSFET**SRT15N090H****Ordering Information**

SRT15N090H□□-□

Circuit Type				E: Lead Free
				G: Green
Package				Blank: Tube
TC: TO-220C				TR: Tape & Reel
S2: TO-263-2				
D56: PDFN5*6				

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
TO-220C	SRT15N090HTC-E	SRT15N090HTC-G	SRT15N090HTCE	SRT15N090HTCG	Tube
TO-263-2	SRT15N090HS2TR-E	SRT15N090HS2TR-G	SRT15N090HS2E	SRT15N090HS2G	Tape & Reel
PDFN5*6	SRT15N090HD56TR-E	SRT15N090HD56TR-G	SRT15N090HD56E	SRT15N090HD56G	Tape & Reel

Absolute Maximum Ratings

Parameter		Symbol	Rating		Unit
Drain-Source Voltage		V _{DSS}	150		V
Gate-Source Voltage		V _{GSS}	±20		V
Continuous Drain Current,Package Limited	T _C =25°C	I _D	TO-220C	105	A
			TO-263-2	105	
			PDFN56	105	
	T _C =100°C		TO-220C	75	
			TO-263-2	75	
			PDFN56	75	
Continuous Drain Current,Silicon	T _C =25°C		TO-220C	105	
			TO-263-2	105	
			PDFN56	105	
Pulsed Drain Current (Note 2)		I _{DM}	TO-220C	420	A
			TO-263-2	420	
			PDFN56	420	
Power Dissipation (T _C = 25°C)		P _D	214		W
Avalanche Destructive Energy, Single Pulse (Note 4)		E _{AS_Limit}	552		mJ
Avalanche Energy, Single Pulse (Note 3)		E _{AS}	81		mJ
Avalanche Energy, Repetitive (Note 2)		E _{AR}	0.1		mJ
Avalanche Current, Repetitive (Note 2)		I _{AR}	22		A
Continuous Diode Forward Current		I _S	105		A
Diode Pulse Current		I _{S,PULSE}	420		A
Operating Junction Temperature		T _J	175		°C
Storage Temperature		T _{STG}	-55 to 175		°C
Lead Temperature (Soldering, 10 sec)		T _{LEAD}	260		°C

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. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $I_{AS} = 18\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
4. $I_{AS_Limit} = 47\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

9.0mΩ, 150V, N-Channel Power MOSFET**SRT15N090H****Thermal Resistance**

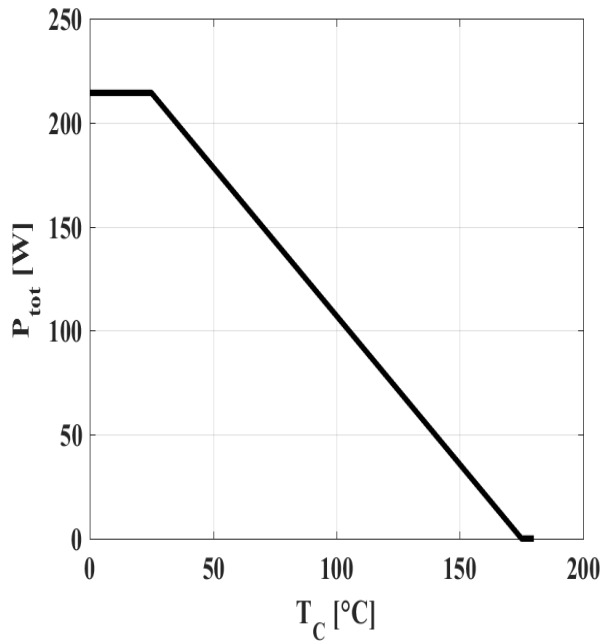
Parameter		Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	TO-220C	R_{thJC}			0.7	°C/W
	TO-263-2				0.7	
	PDFN5*6				0.7	
Thermal Resistance, Junction-to-Ambient	TO-220C	R_{thJA}			62	
	TO-263-2				62	
	PDFN5*6				50	

9.0mΩ, 150V, N-Channel Power MOSFET
SRT15N090H
Electrical Characteristics
 $T_J = 25^{\circ}\text{C}$, unless otherwise specified.

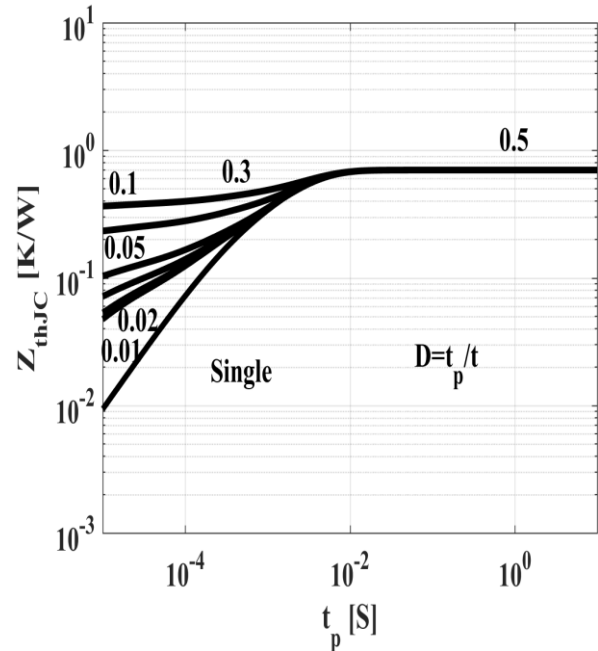
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250uA	150			V
Zero Gate Voltage Drain Current		I _{DSS}	V _{DS} =150V, V _{GS} =0V			1	uA
Gate-Body Leakage Current	Forward	I _{GSSF}	V _{GS} =20V, V _{DS} =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	TO-220C	R _{DS(ON)}	V _{GS} =10V, I _D =60A		7.3	9.0	mΩ
	TO-263-2				7.2	9.0	mΩ
	PDFN5*6				7.1	9.0	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain		1.2		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =50V, V _{GS} =0V, f=1MHz		2.2		nF
Output Capacitance		C _{OSS}			1.5		nF
Reverse Transfer Capacitance		C _{RSS}			23		pF
Effective output capacitance, energy related ^{NOTE5}		C _{O(er)}	V _{GS} =0V, V _{DS} =0...90V		1.4		nF
Effective output capacitance, time related ^{NOTE6}		C _{O(tr)}			1.7		
Turn-on Delay Time		t _{d(on)}	V _{DD} =75V, I _D =60A R _G =1.6Ω, V _{GS} =10V		8		nS
Rise Time		t _r			4		
Turn-off Delay Time		t _{d(off)}			13		
Fall Time		t _f			4		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =75V, I _D =60A V _{GS} =0 to 10V		11.7		nC
Gate to Drain Charge		Q _{gd}			7.6		
Gate Charge Total		Q _g			32.0		
Gate Plateau Voltage		V _{plateau}			5.4		V
Gate Charge Total, sync FET		Q _g	V _{DD} =0.1V, V _{GS} =0 to 10V		26.9		nC
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _{SD} =60A		0.87	1.1	V
Reverse Recovery Time		t _{rr}	V _R =75V, I _F =60A dI _F /dt=100A/us		28		nS
Reverse Recovery Charge		Q _{rr}			27		nC
Peak Reverse Recovery Current		I _{rrm}			1.9		A

Note:

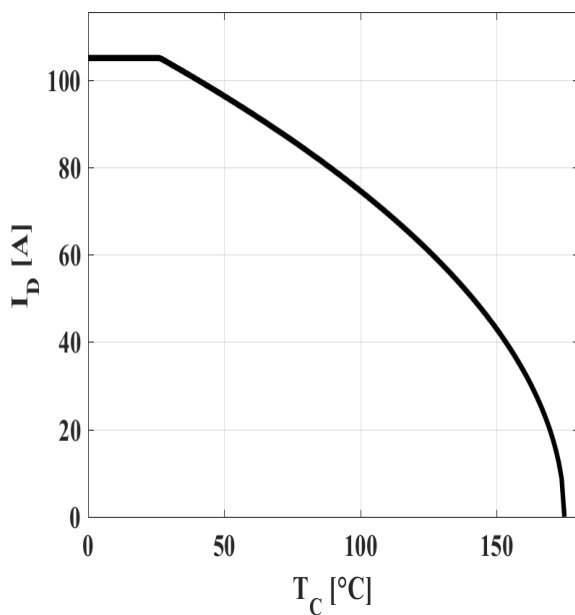
- $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 90V
- $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 90V

Typical Performance Characteristics
Figure 3: Power Dissipation


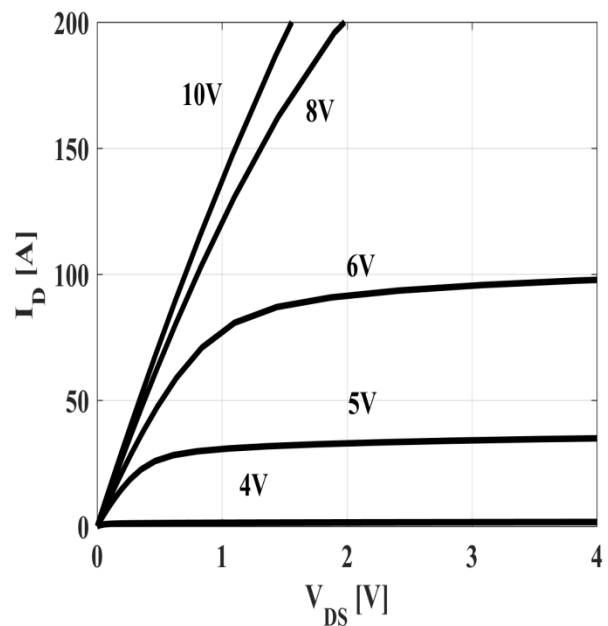
$$P_{tot}=f(T_c)$$

Figure 4: Max. Transient Thermal Impedance


$$Z_{(th)JC}=f(t_p); \text{parameter: } D=t_p/T$$

Figure5: Drain Current


$$I_D=f(T_c); V_{GS} \geq 10V$$

Figure6: Typ. Output Characteristics


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

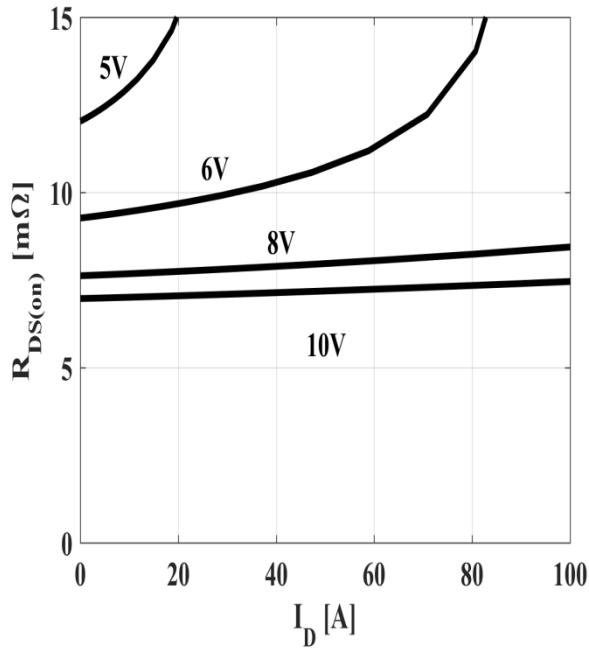
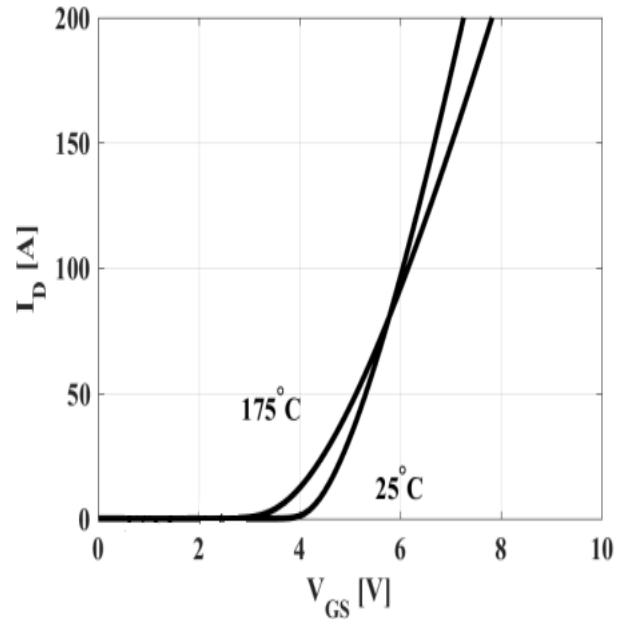
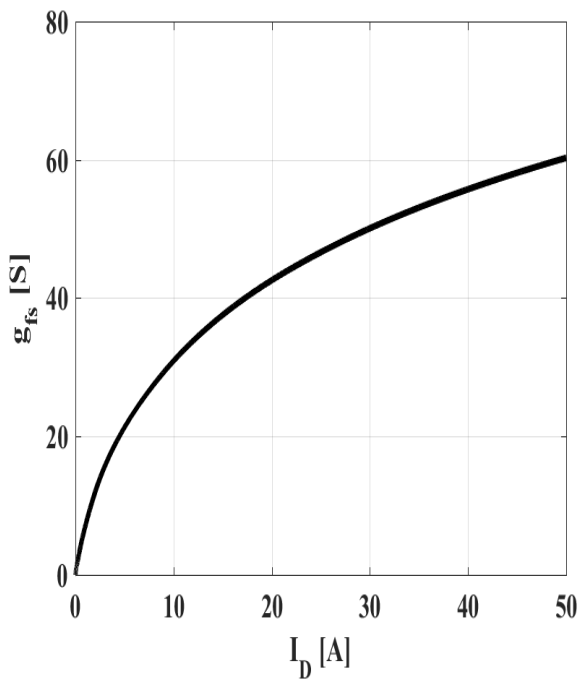
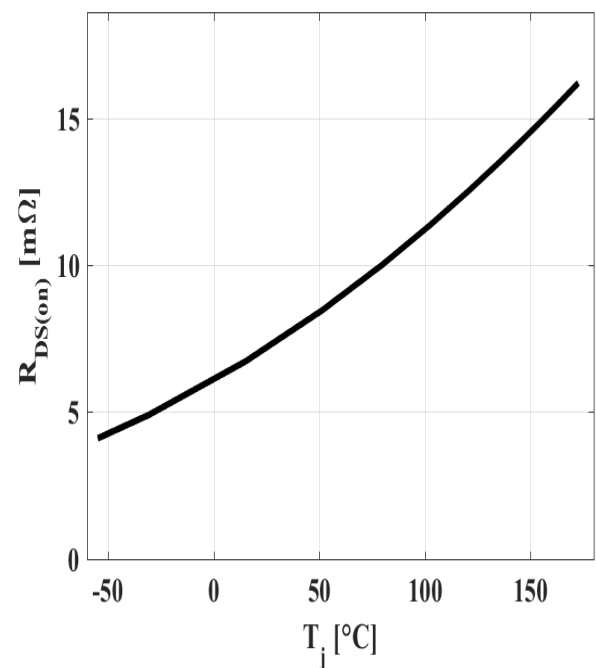
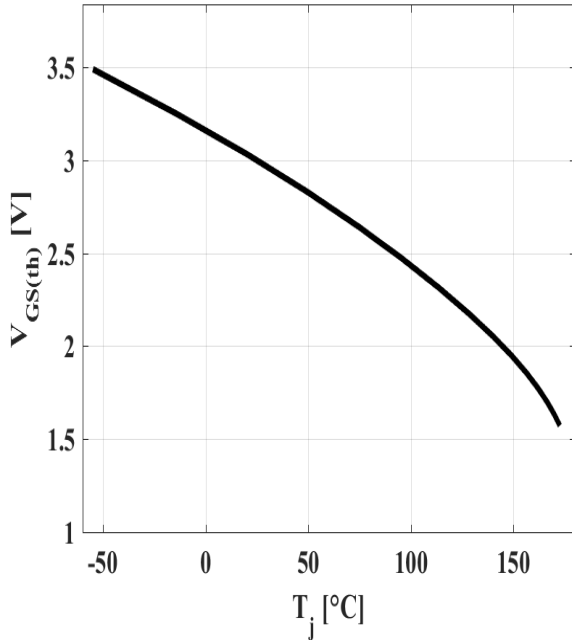
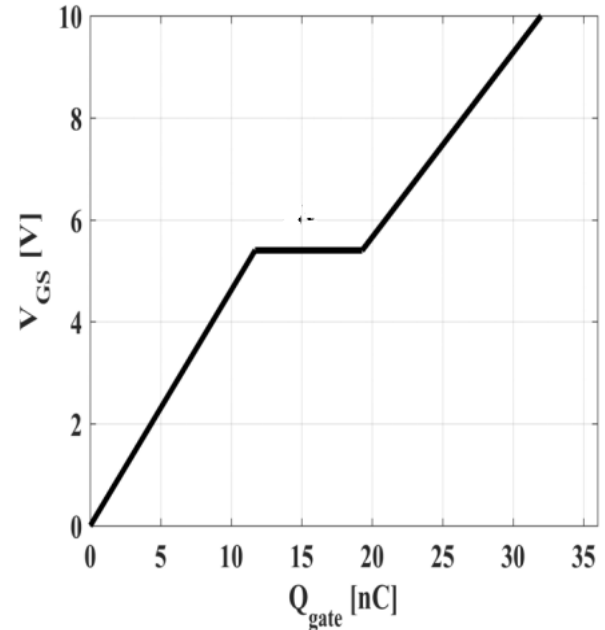
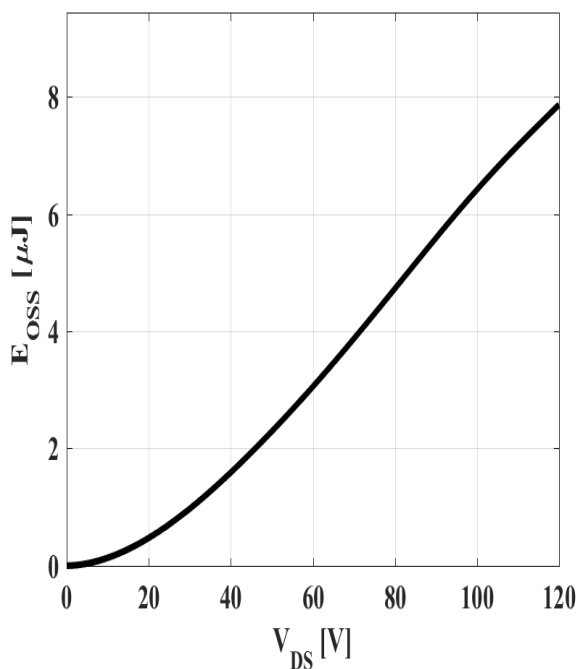
Figure7: Typ. Drain-Source On-State Resistance

 $R_{DS(ON)}=f(I_D); T_j=25^{\circ}\text{C}; \text{parameter: } V_{GS}$
Figure8: Typ. Transfer Characteristics

 $I_D=f(V_{GS}); |V_{DS}|>2|I_D|R_{DS(on)max}; \text{parameter: } T_j$
Figure9: Typ. Forward Transconductance

 $g_{fs}=f(I_D); T_j=25^{\circ}\text{C}$
Figure10: Typ. Drain-Source On-State Resistance

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

Figure11: Typ.Gate Threshold Voltage


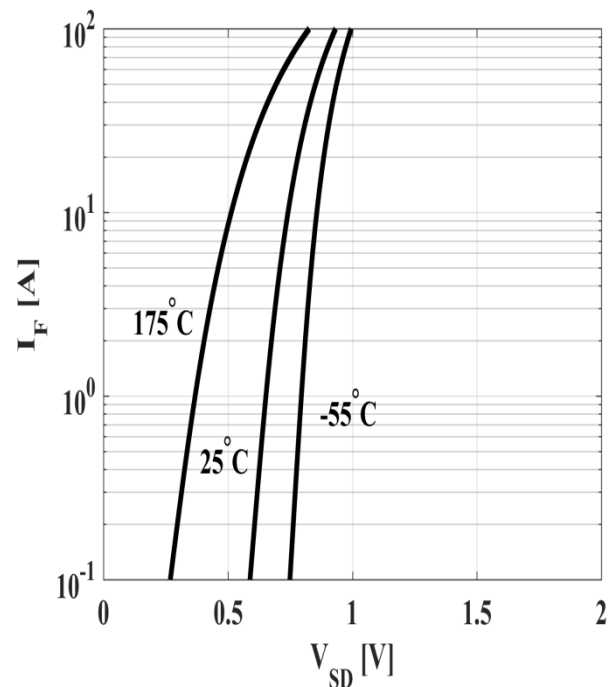
$$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_{DS}=250\mu A$$

Figure 12: Typ. Gate Charge


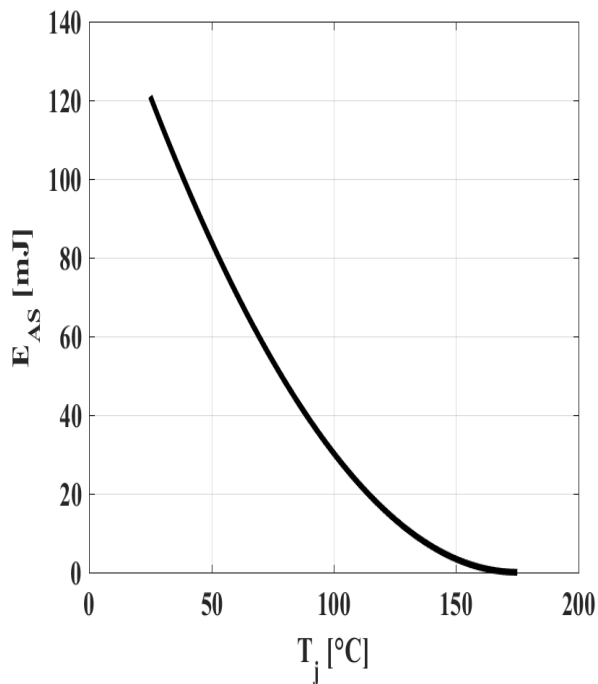
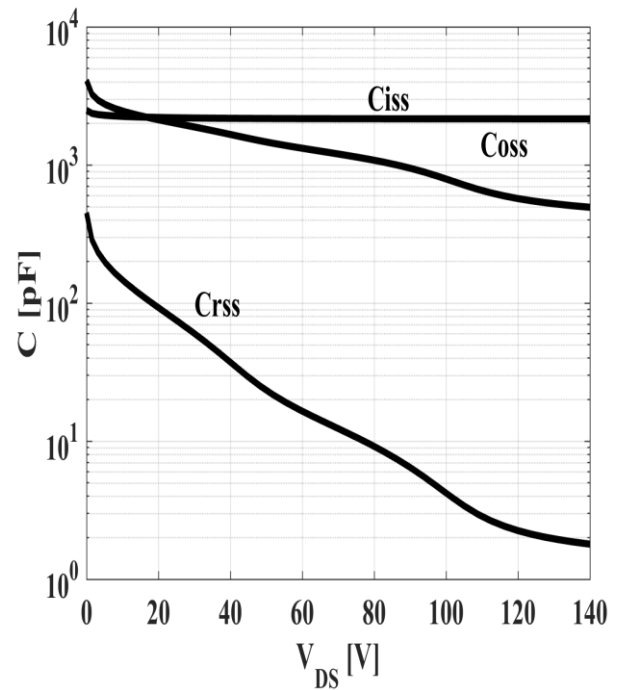
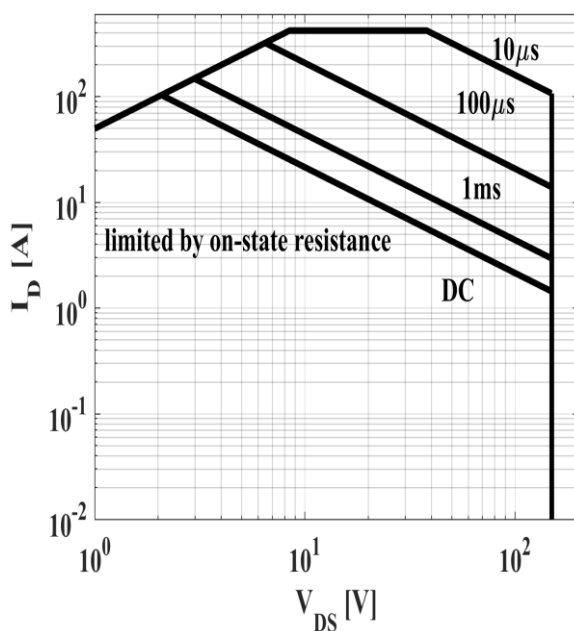
$$V_{GS}=f(Q_{gate}), I_D=60A \text{ pulsed}$$

Figure 13: Coss Stored Energy


$$E_{OSS}=f(V_{DS})$$

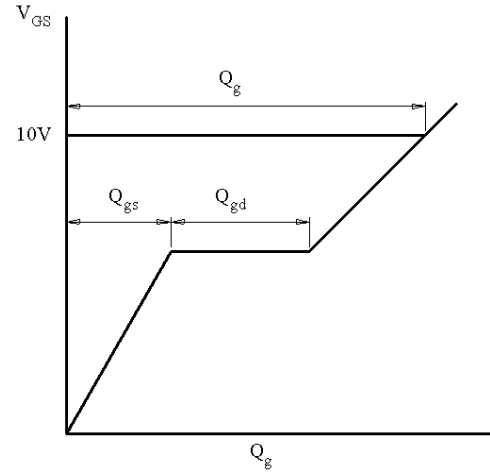
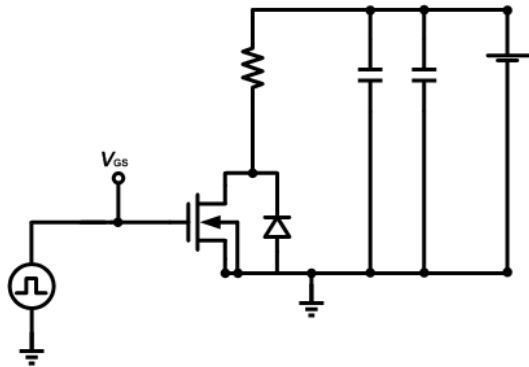
Figure 14: Forward Characteristics of Reverse Diode


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

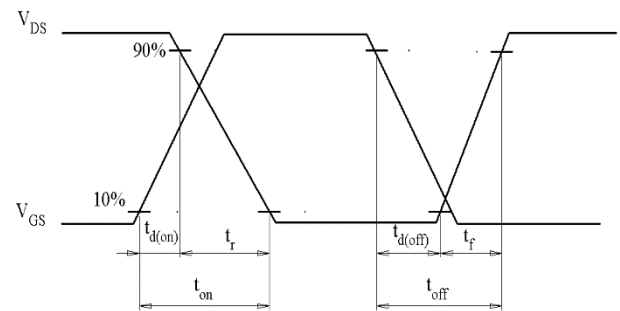
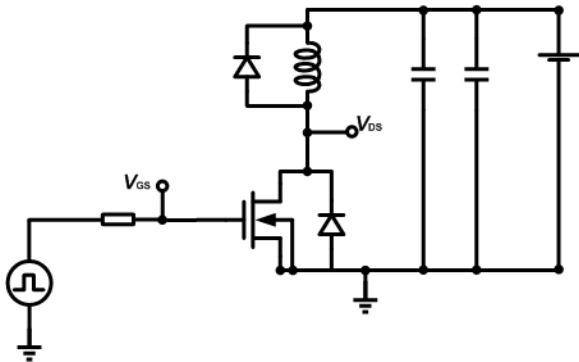
9.0mΩ, 150V, N-Channel Power MOSFET
SRT15N090H
Figure 15: Avalanche Energy

 $E_{AS}=f(T_j); I_D=40.0A; V_{DD}=75V$
Figure 16: Typ. Capacitances

 $C=f(V_{DS}); V_{GS}=0; f=1MHz$
Figure 17: Safe Operating Area

 $I_D = f(V_{DS}); T_c = 25^{\circ}C; V_{GS} > 7V; \text{parameter } t_p$

Test Circuits

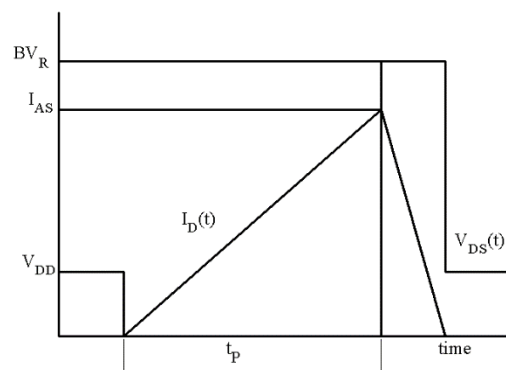
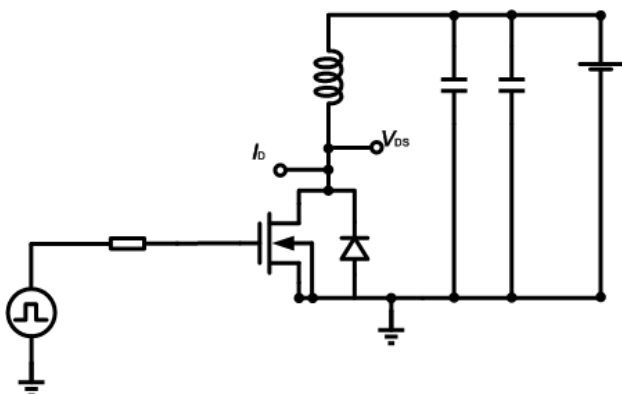
1. Gate Charge Test Circuit & Waveform



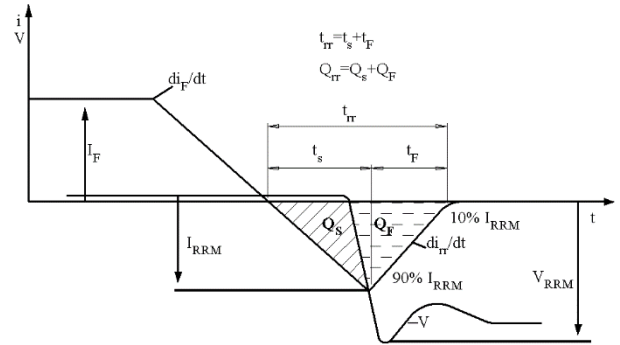
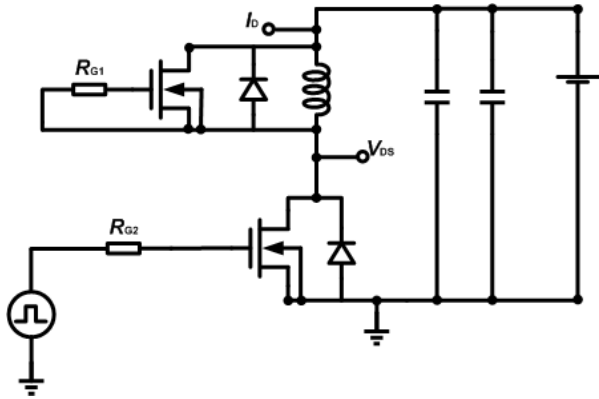
2. Switch Time Test Circuit

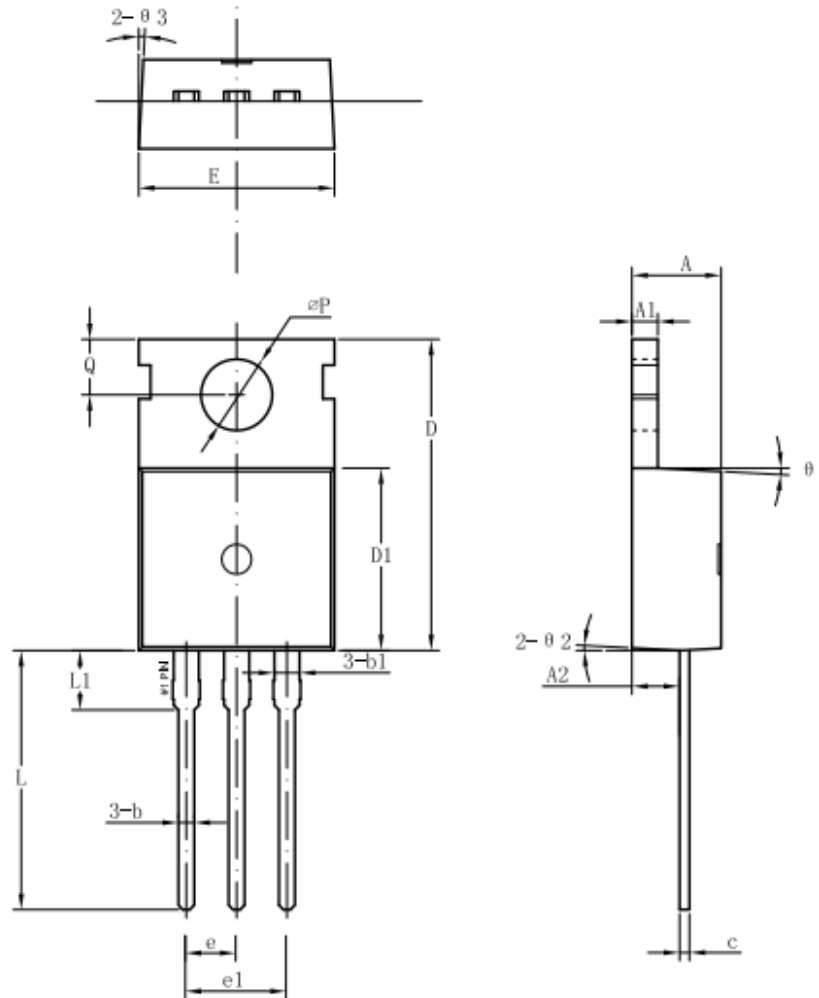


3. Unclamped Inductive Switching Test Circuit & Waveforms

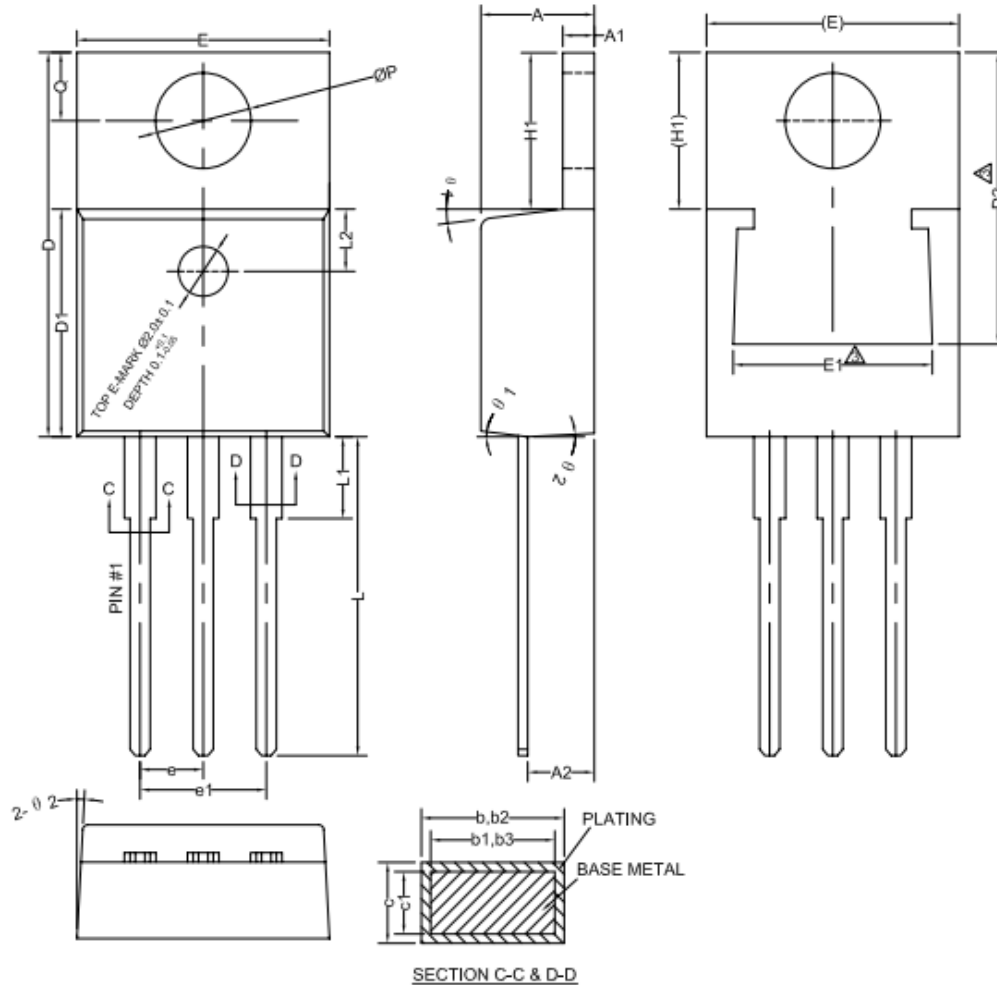


4. Test Circuit and Waveform for Diode Characteristics

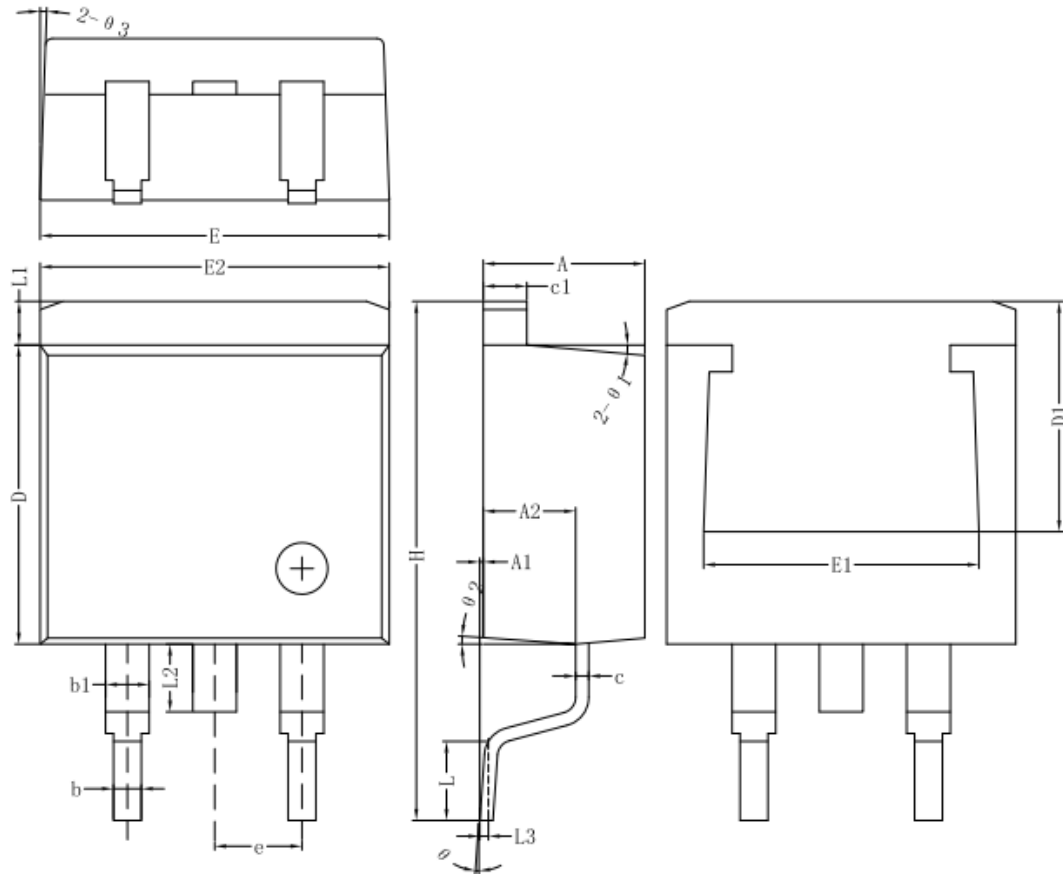


Mechanical Dimensions
TO-220C(Package1)
Unit: mm


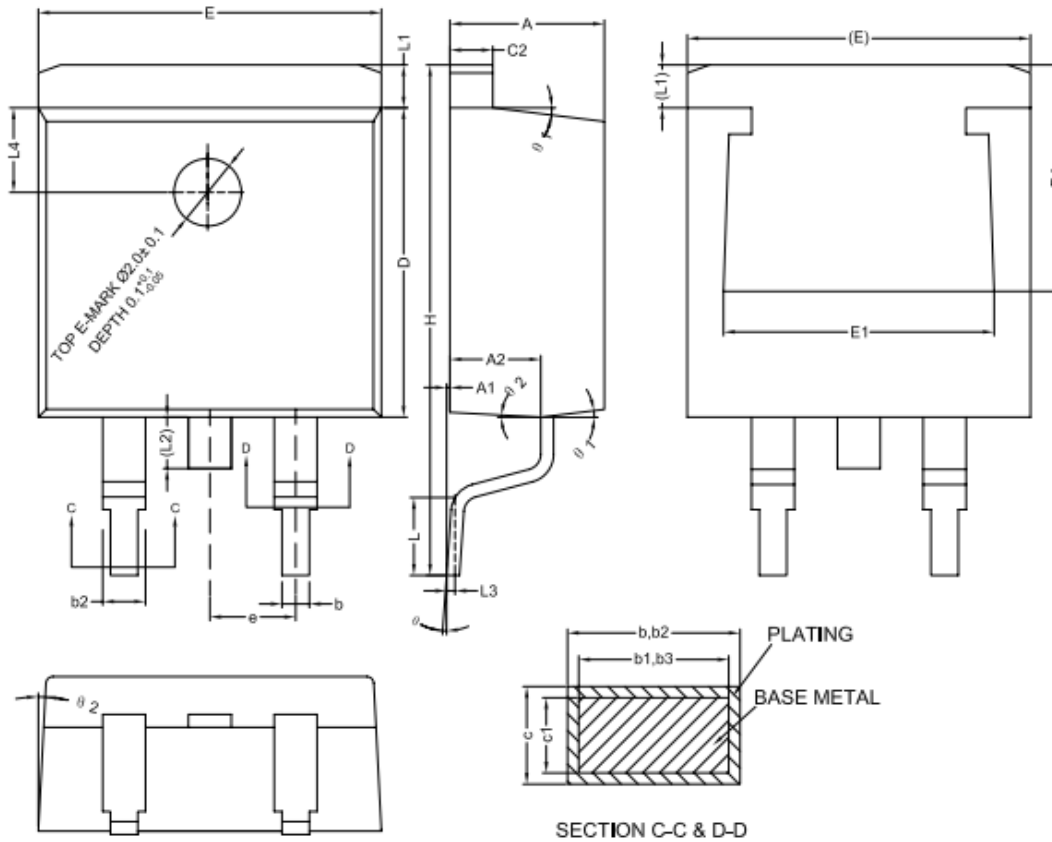
Symbol	Dimensions (mm)			Symbol	Dimensions (mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.30	4.50	4.70	e	—	2.54	—
A1	1.25	1.30	1.40	e1	—	5.08	—
A2	2.20	2.40	2.60	L	12.60	13.08	13.60
b	0.70	0.80	0.95	L1	—	3.00	—
b1	—	1.27	—	ΦP	3.50	3.60	3.80
c	0.40	0.50	0.65	Q	2.60	2.80	3.00
D	15.20	15.70	16.20	θ1	—	3°	—
D1	9.00	9.20	9.40	θ2	—	3°	—
E	9.70	10.00	10.10	θ3	—	3°	—

Mechanical Dimensions
TO-220C(Package2)
Unit: mm


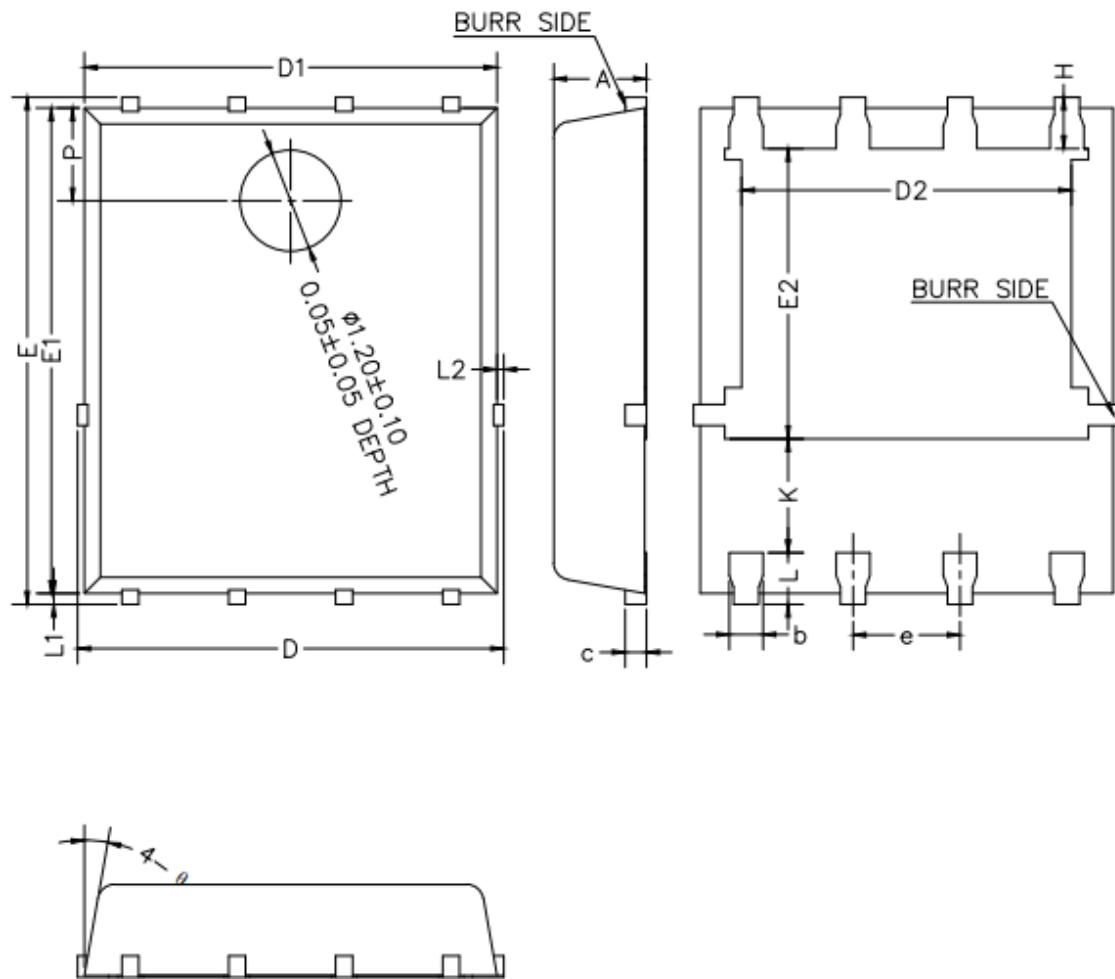
Symbol	Dimensions (mm)			Symbol	Dimensions (mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.40	4.57	4.70	E	9.96	10.16	10.36
A1	1.22	—	1.32	E1	6.86	—	8.89
A2	2.59	2.69	2.79	e	2.44	2.54	2.64
b	0.77	—	0.90	e1	4.98	5.08	5.18
b1	0.76	0.81	0.86	H1	6.10	6.30	6.50
b2	1.23	—	1.36	L	12.70	—	13.12
b3	1.22	1.27	1.32	L1	—	—	3.90
c	0.34	—	0.47	L2	—	2.50REF	—
c1	0.33	0.38	0.43	ΦP	3.80	3.84	3.88
D	15.15	15.45	15.75	Q	2.60	—	2.90
D1	9.05	9.15	9.25	$\theta 1$	5°	7°	9°
D2	11.40	—	12.88	$\theta 2$	1°	3°	5°

Mechanical Dimensions (Continued)
TO-263-2(Package1)
Unit: mm


Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.55	4.70	4.85	E2	9.98	10.08	10.18
A1	0.00	0.10	0.25	e	—	2.54	—
A2	2.59	2.69	2.89	H	14.70	15.10	15.50
b	0.71	0.81	0.96	L	2.00	2.30	2.70
b1	—	1.27	—	L1	1.17	1.27	1.40
c	0.36	0.38	0.61	L2	—	—	2.20
c1	1.17	1.27	1.37	L3	—	0.25BSC	—
D	8.55	8.70	8.85	θ	0°	—	8°
D1	—	7.20	—	θ1	—	5°	—
E	10.01	10.16	10.31	θ2	—	4°	—
E1	—	7.8	—	θ3	—	4°	—

Mechanical Dimensions (Continued)
TO-263-2(Package2)
Unit: mm


Symbol	Dimensions (mm)			Symbol	Dimensions (mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.40	4.57	4.70	E	10.06	10.16	10.26
A1	0.00	0.10	0.25	E1	7.80	—	8.20
A2	2.59	2.69	2.79	e	—	2.54BSC	—
b	0.77	—	0.90	H	14.70	15.10	15.50
b1	0.76	0.81	0.86	L	2.00	2.30	2.60
b2	1.23	—	1.36	L1	1.17	1.27	1.40
b3	1.22	1.27	1.32	L2	—	—	1.75
c	0.34	—	0.47	L3	—	0.25BSC	—
c1	0.33	0.38	0.43	L4	—	2.00REF	—
c2	1.22	—	1.32	Θ	0°	—	8°
D	9.05	9.15	9.25	Θ1	5°	7°	9°
D1	6.60	—	—	Θ2	1°	3°	5°

Mechanical Dimensions
PDFN5*6-8
Unit: mm


Symbol	Dimensions (mm)			Symbol	Dimensions (mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.90	1.10	1.20	E2	3.62	—	3.82
b	0.35	0.40	0.45	H	0.38	0.48	0.58
c	0.21	0.25	0.34	K	1.10	—	—
D	—	—	5.10	L	0.51	0.61	0.71
D1	4.80	4.90	5.00	L1	0.06	0.13	0.20
D2	4.11	—	4.31	L2	—	—	0.15
e	1.17	1.27	1.37	P	1.00	1.10	1.20
E	5.90	6.00	6.10	θ	8°	10°	12°
E1	5.70	5.75	5.80				



Sanrise Technology Limited Company

<http://www.sanrise-tech.com>

IMPORTANT NOTICE

Shenzhen Sanrise Technology Co., LTD. reserves the right to make changes without further notice to any products or specifications herein. Shenzhen Sanrise Technology Co., LTD. does not assume any responsibility for use of any its products for any particular purpose, nor does Shenzhen Sanrise Technology Co., LTD. assume any liability arising out of the application or use of any its products or circuits. Shenzhen Sanrise Technology Co., LTD. does not convey any license under its patent rights or other rights nor the rights of others.

Main Site:

- Headquarter

Shenzhen Sanrise Technology Co., LTD.

A1206, Skyworth building, No. 008, gaoxinnan 1st Road,
Gaoxin District, Yuehai street,, Nanshan District, ShenZhen,
P.R.China

Tel: +86-755-22953335

Fax: +86-755-22916878

- Shanghai Office

Sanrise Technology Limited Company

Rm.401, Building B, No. 666, Zhangheng Road,
Zhangjiang Hi-Tech Park, Shanghai, P.R.China

Tel: +86-21-68825918