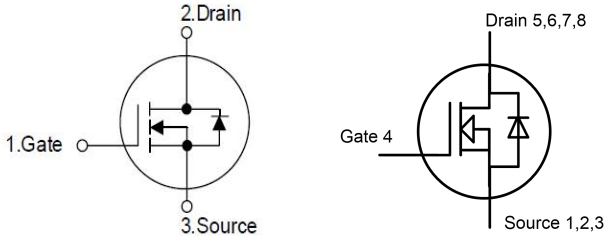
7mΩ, 100V, N-Channel Power MOSFET SRT10N070H

General Description

The Sanrise SRT10N070H 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 SRT10N070H break down voltage is 100V and it has a high rugged avalanche characteristics. The SRT10N070H is available in PDFN5*6 and TO-220C packages.

Symbol



TO-220C PDFN5*6

Figure 1 Symbol of SRT10N070H

Features

- Ultra Low

$R_{DS(ON)\_TYP}$ = 5.7mΩ ,PDFN5*6 @V_{GS} = 10V.

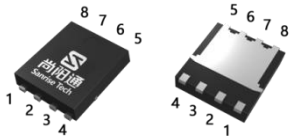
$R_{DS(ON)\_TYP}$ = 6.3mΩ ,TO-220C @V_{GS} = 10V.

- Ultra Low Gate Charge, Qg=32.1nC typ.
- Fast switching capability
- Robust design with better EAS performance
- Non-automotive Qualified

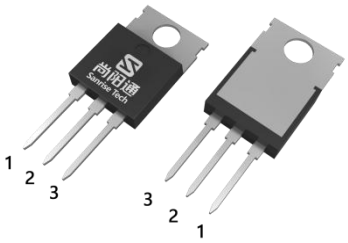
Application

- Charger / Adapter
- Server/Telecom
- High Power Supply
- E-Tools

Package Type



PDFN5*6



TO-220C

Figure 2 Package Type of SRT10N070H

Ordering Information

SRT10N070H□□–□

Circuit Type

Package

D56: PDFN5*6

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	
PDFN5*6	SRT10N070HD56TR-E	SRT10N070HD56TR-G	SRT10N070HD56E	SRT10N070HD56G	Tape & Reel
TO-220C	SRT10N070HTC-E	SRT10N070HTC-G	SRT10N070HTCE	SRT10N070HTCG	Tube

7mΩ, 100V, N-Channel Power MOSFET SRT10N070H

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	PDFN5*6	84	A
			TO-220C	87	
	T_C=100ºC		PDFN5*6	53	
			TO-220C	56	
Pulsed Drain Current (Note 2)		I_{DM}	336		A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	36		mJ
Avalanche Destructive Energy, Single Pulse (Note 4)		E_{AS_Limit}	306		mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.05		mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	12		A
Continuous Diode Forward Current		I_S	84		A
Diode Pulse Current		$I_{S.PULSE}$	320		A
Max Power Dissipation		P_D	96.1		W
Operating Junction Temperature		T_J	150		ºC
Storage Temperature		T_{STG}	-55 to 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. Repetitive Rating: Pulse width limited by maximum junction temperature
3. I_{AS}= 12.0A, V_{DD}= 50V, R_G= 25Ω, Starting T_J= 25°C
4. I_{AS_Limit}= 35A, V_{DD}= 50V, 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}			1.3	ºC/W
Thermal Resistance，Junction-to-Ambient		R_{thJA}			50	ºC/W
Thermal Resistance，Junction-to-Case	TO-220C	R_{thJC}			1.1	ºC/W
Thermal Resistance，Junction-to-Ambient		R_{thJA}			60	ºC/W

7mΩ, 100V, N-Channel Power MOSFET SRT10N070H

Electrical Characteristics

T_J = 25℃, unless otherwise specified.

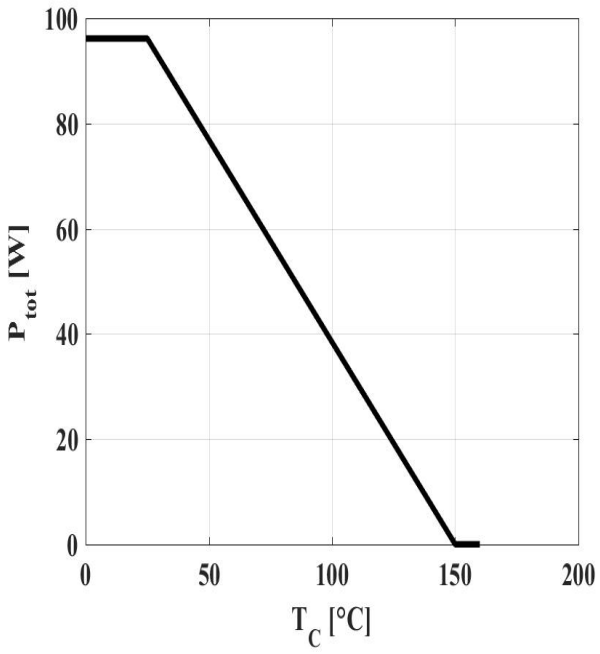
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250uA	100			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-100	
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	PDFN5*6	$R_{DS(ON)}$	V_{GS}=10V, I_D=14A		5.7	7.0	mΩ
	TO-220C		V_{GS}=10V, I_D=14A		6.3	7.5	
Gate Resistance		R_G	f=1MHz, Open Drain		1.7		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1MHz		2.1		nF
Output Capacitance		C_{OSS}			720		pF
Reverse Transfer Capacitance		C_{RSS}			13		pF
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…80V		690		pF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			920		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=50V, I_D=30A R_G=3.0Ω, V_{GS}=10V		10		nS
Rise Time		t_r			5		
Turn-off Delay Time		$t_{d(off)}$			22		
Fall Time		t_f			6		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=50V, I_D=30A V_{GS}=0 to 10.0V		9.7		nC
Gate to Drain Charge		Q_{gd}			6.2		
Gate Charge Total		Q_g			32.1		
Gate Plateau Voltage		$V_{plateau}$			4.6		V
Gate Charge Total, sync FET		Q_g	V_{DD}=0.1V, V_{GS}=0 to 10V		27.6		nC
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=30A		0.85	1.1	V
Reverse Recovery Time		t_{rr}	V_R=50V, I_F=30A dI_F/dt=100A/us		53		nS
Reverse Recovery Charge		Q_{rr}			93		nC
Peak Reverse Recovery Current		I_{rrm}			3.5		A

Note:

5. $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 80V
6. $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80 V

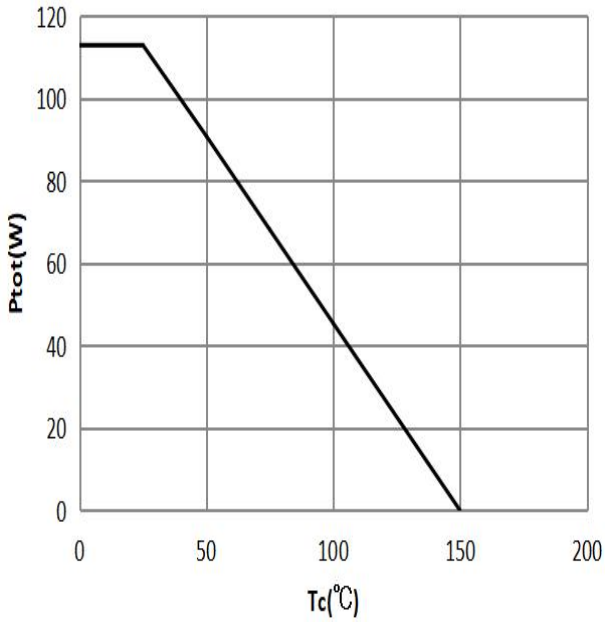
Typical Performance Characteristics

Figure 3A: Power Dissipation (PDFN5*6)



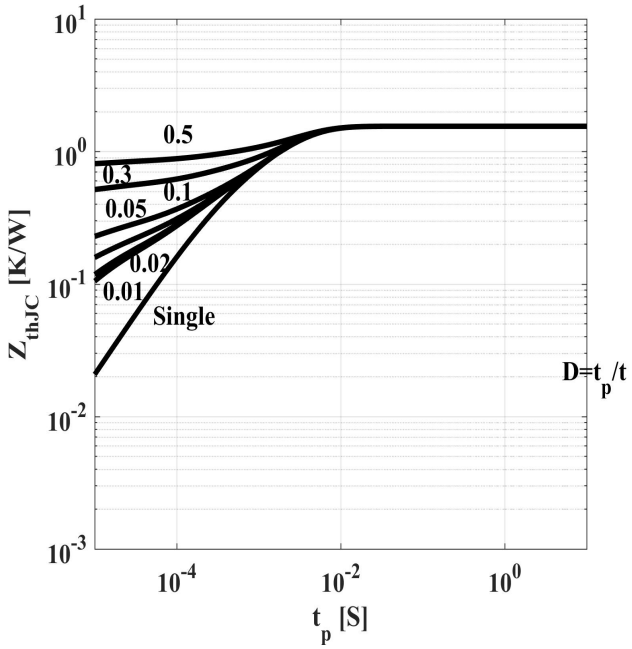
$P_{tot}=f(T_c)$

Figure 3B: Power Dissipation (TO-220C)



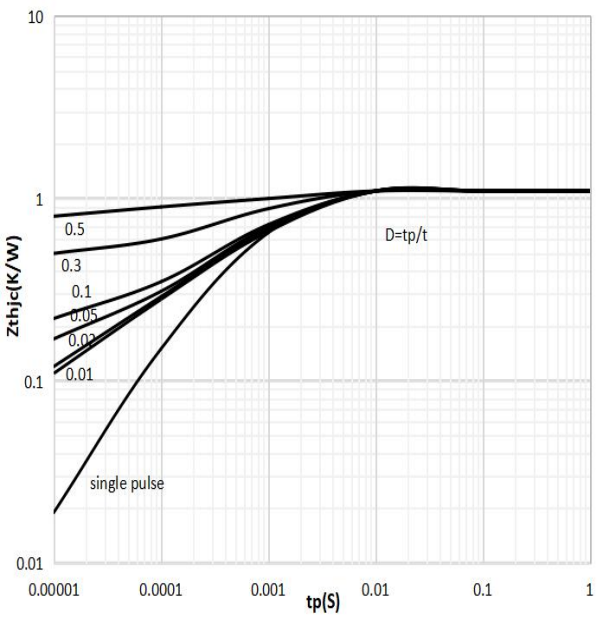
$P_{tot}=f(T_c)$

Figure 4A: Max. Transient Thermal Impedance (PDFN5*6)



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

Figure 4B: Max. Transient Thermal Impedance (TO-220C)



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

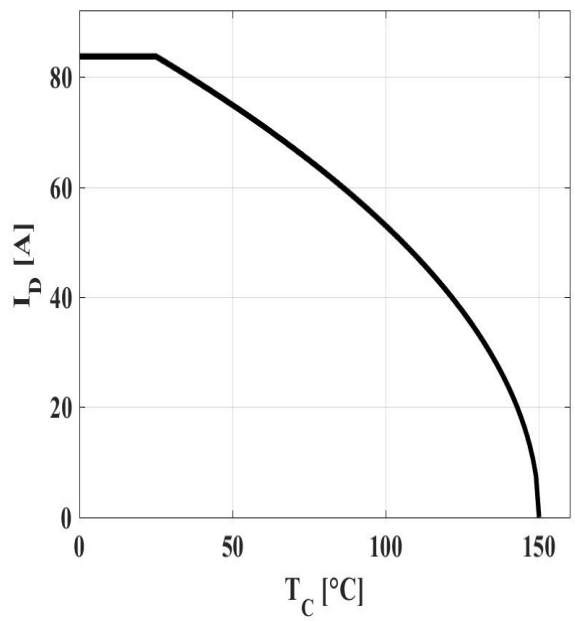
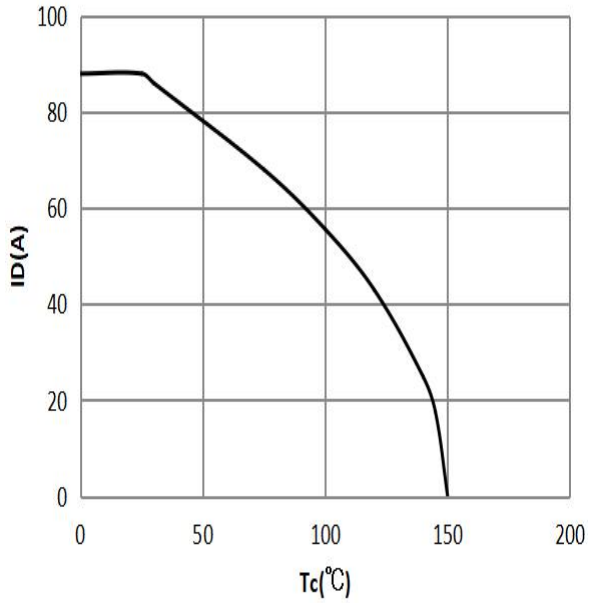
Figure5A: Drain Current(PDFN5*6)	Figure5B: Drain Current(TO-220C)
	
$I_D=f(T_C);V_{GS}\geq10V$	$I_D=f(T_C);V_{GS}\geq10V$

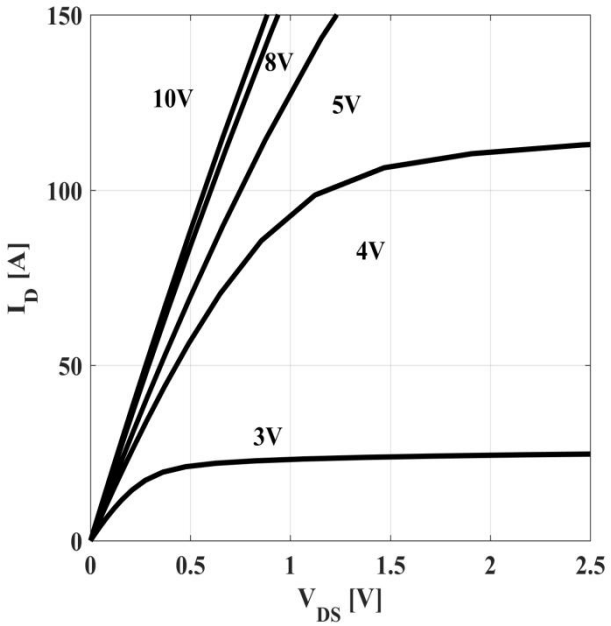
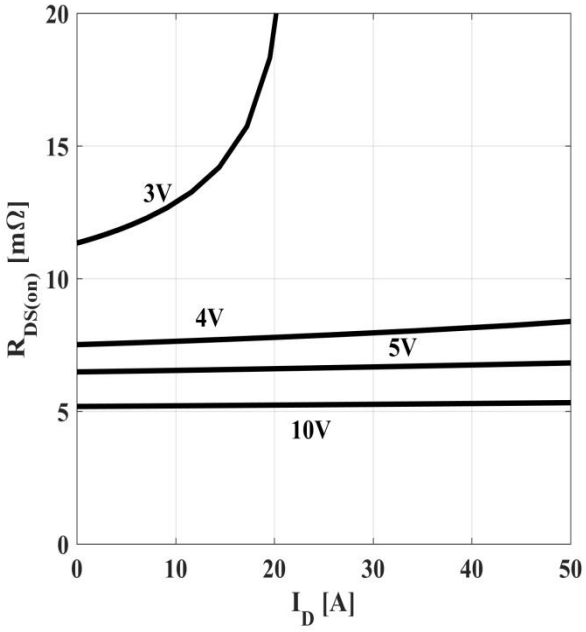
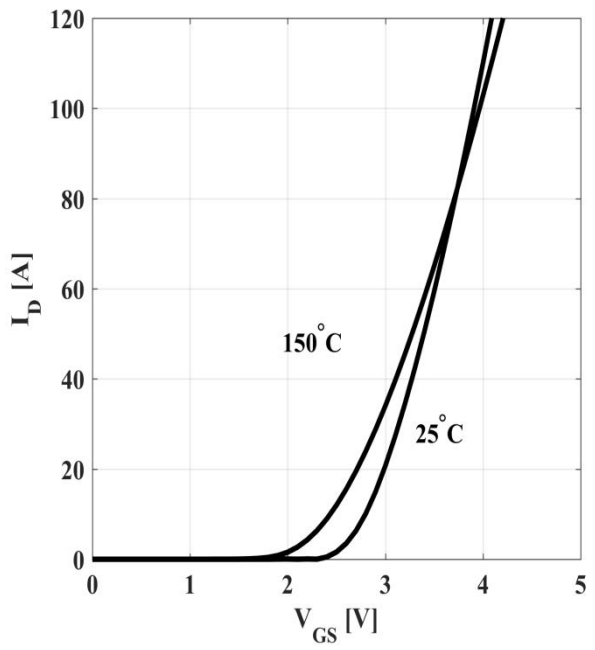
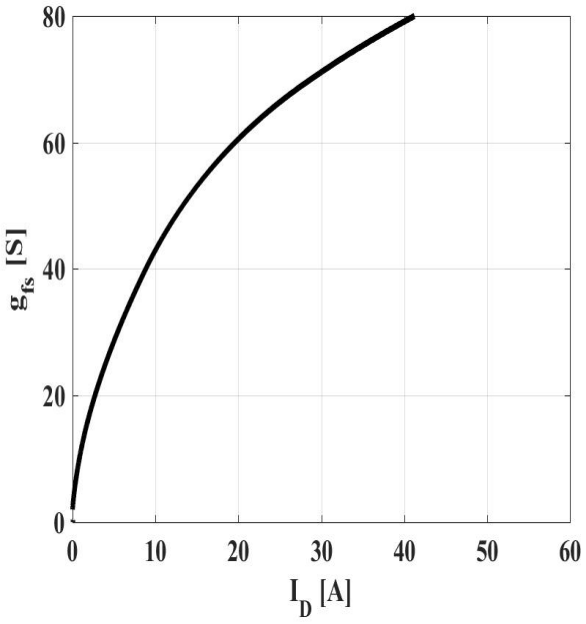
Figure6: Typ. Output Characteristics	Figure7: Typ. Drain-Source On-State Resistance
	
$I_D=f(V_{DS});Tj=25ºC$; parameter:V_{GS}	$R_{DS(ON)}=f(I_D);T_j=25ºC$; parameter:$V_{GS}$

Figure8: Typ. Transfer Characteristics



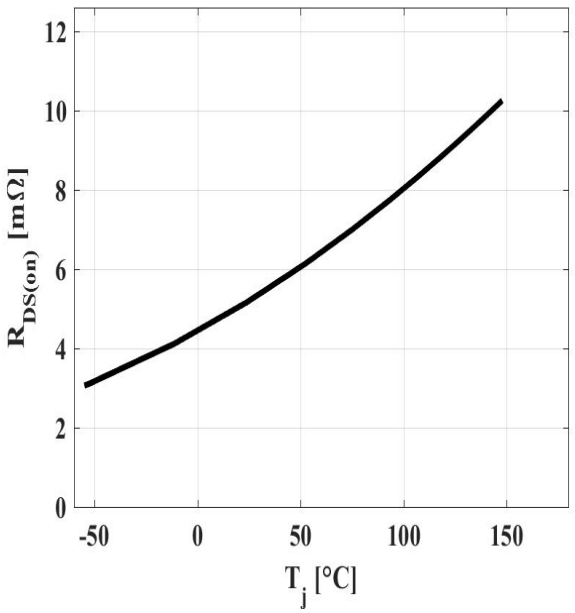
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: T_j

Figure9: Typ. Forward Transconductance



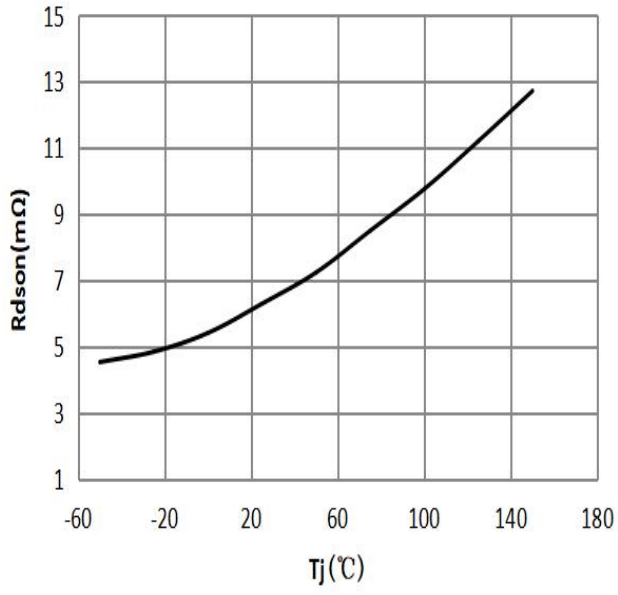
$g_{fs}=f(I_D)$; $T_j=25℃$

Figure10A: Typ. Drain-Source On-State Resistance(PDFN5*6)



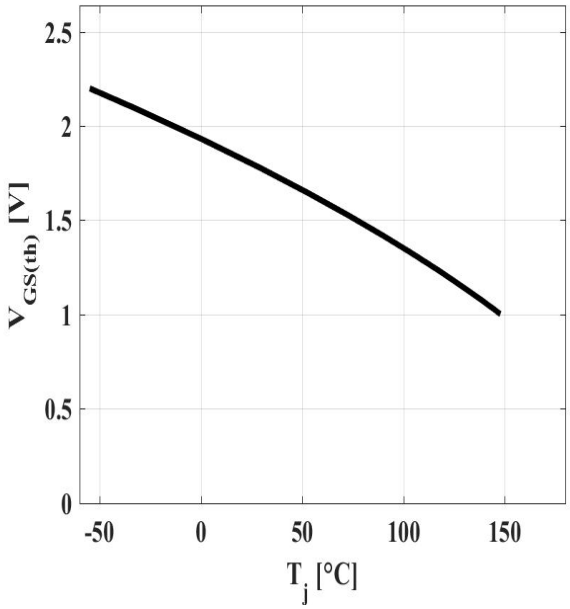
$R_{DS(ON)}=f(T_j)$;$I_D=14A$;$V_{GS}=10V$

Figure10: Typ. Drain-Source On-State Resistance (TO-220C)



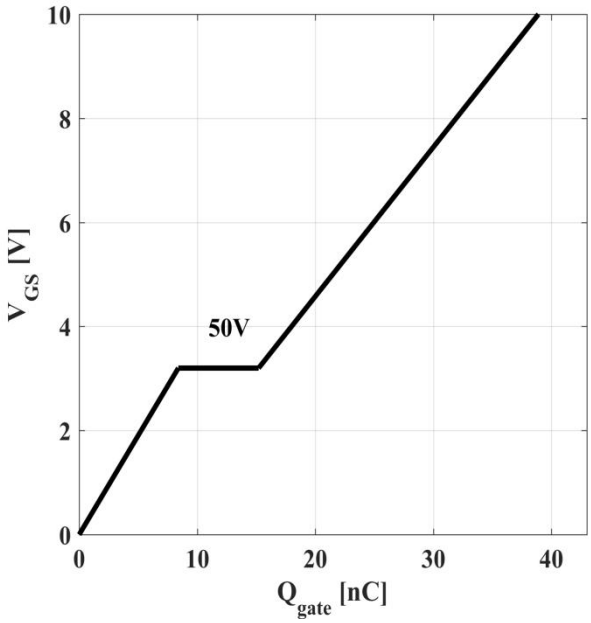
$R_{DS(ON)}=f(T_j)$;$I_D=14A$;$V_{GS}=10V$

Figure11: Typ.Gate Threshold Voltage



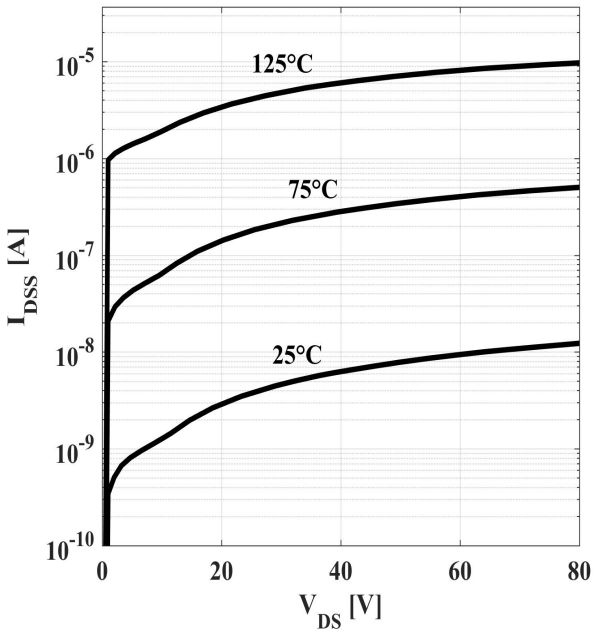
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_{DS}=250\mu A$

Figure 12: Typ. Gate Charge



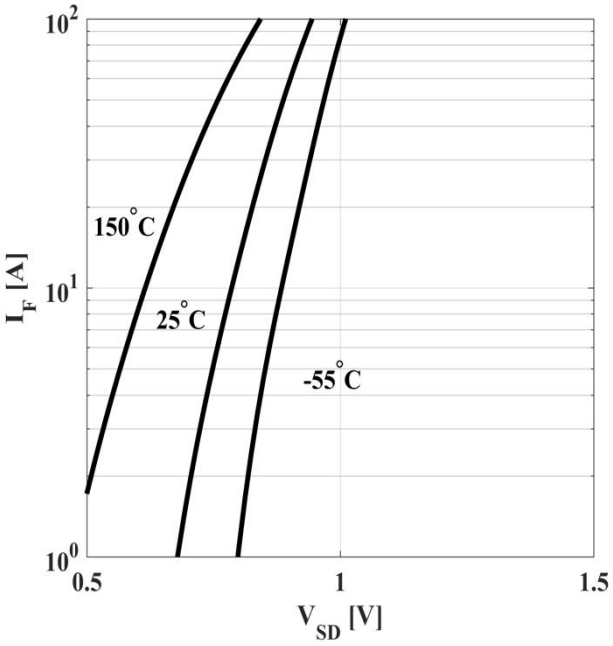
$V_{GS}= f(Q_{gate})$, $I_D=14A$ pulsed

Figure 13: Drain-Source Leakage Current



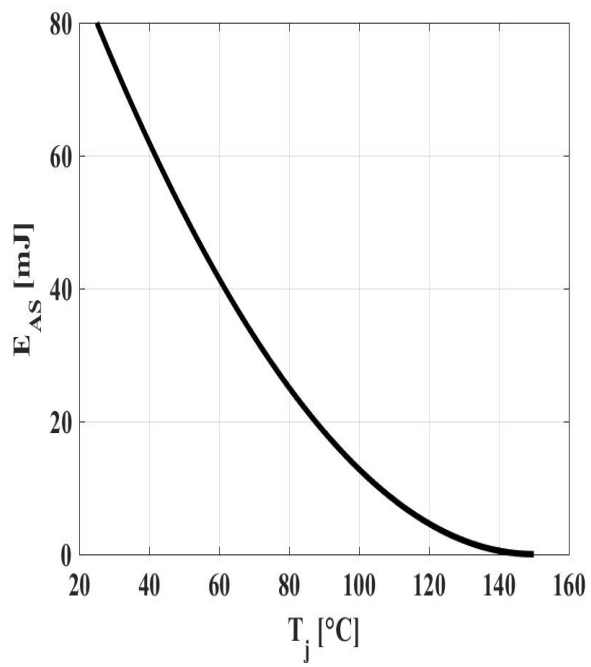
$I_{DSS}=f(V_{DS})$; $V_{GS}=0V$; parameter: T_j

Figure 14: Forward Characteristics of Reverse Diode



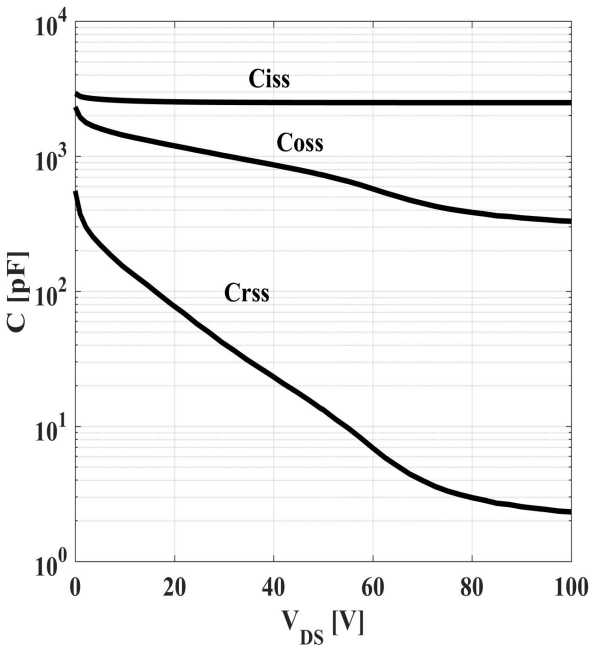
$I_F=f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



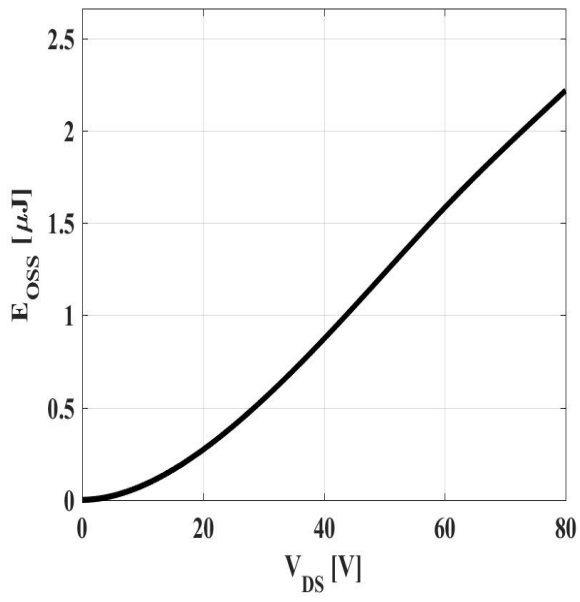
$E_{AS}=f(T_j)$;I_D=14.0A; V_{DD}=50V

Figure 16: Typ. Capacitances



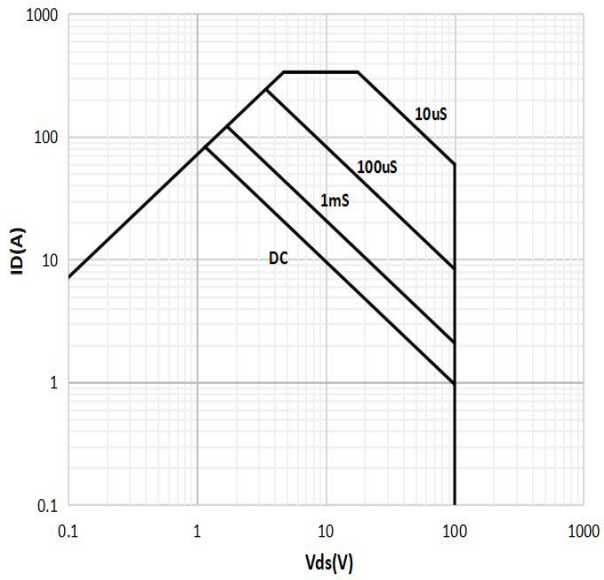
$C=f(V_{DS})$; V_{GS}=0; f=1MHz

Figure 17: C_{OSS} Stored Energy



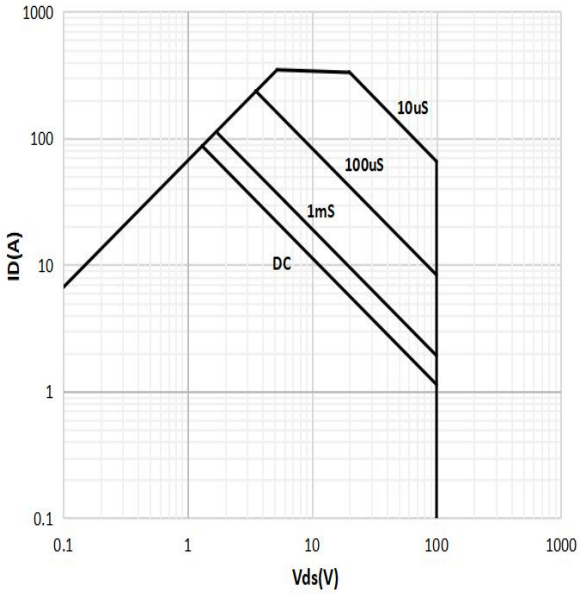
$E_{OSS}=f(V_{DS})$

Figure 18A: Safe Operating Area(PDFN5*6)



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

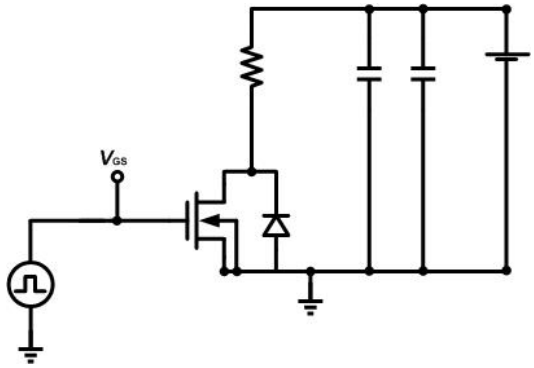
Figure 18B: Safe Operating Area(TO-220C)

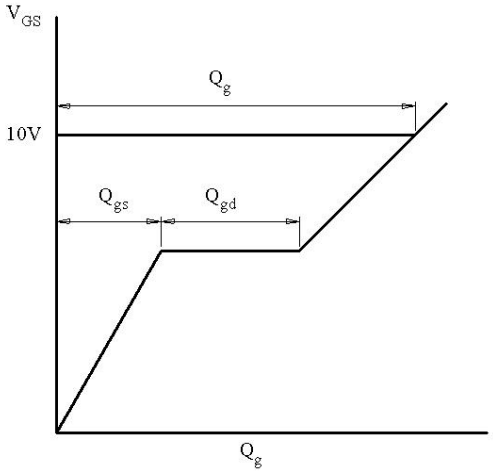


$I_D = f(V_{DS})$; T_c= 25ºC; V_{GS}>7V; parameter t_p

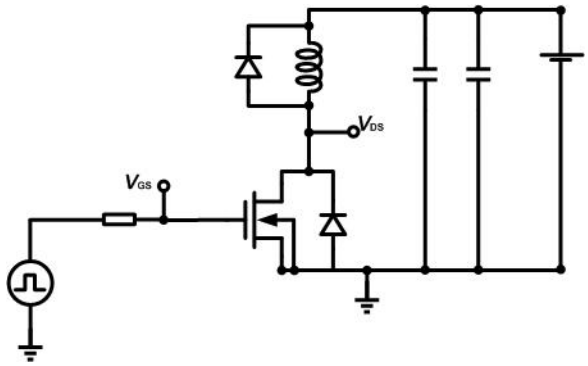
Test Circuits

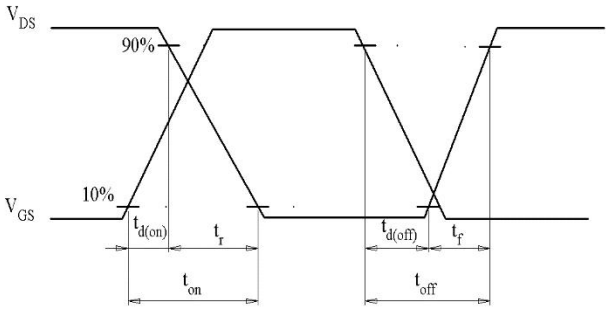
1. Gate Charge Test Circuit & Waveform



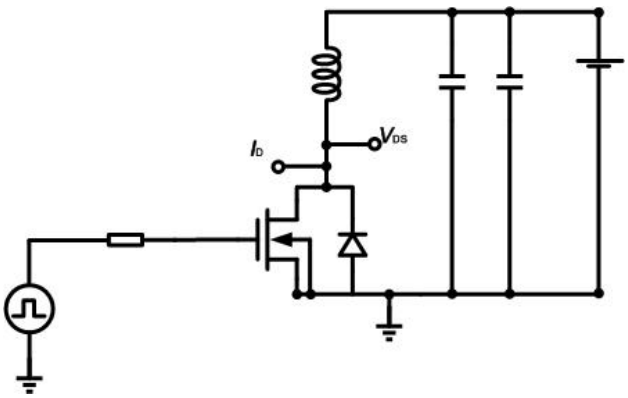


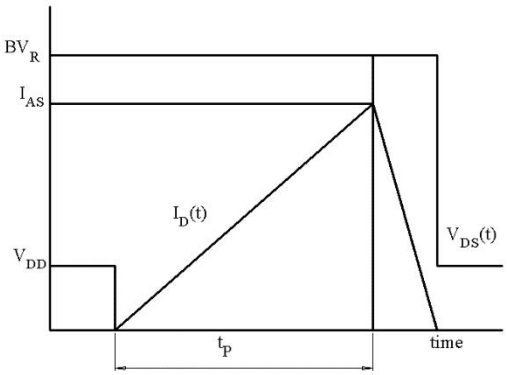
2. Switch Time Test Circuit



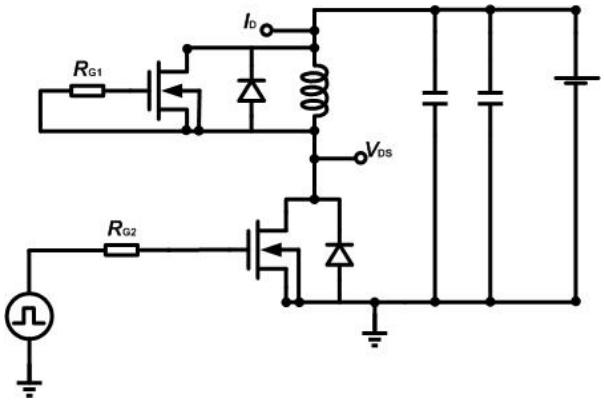


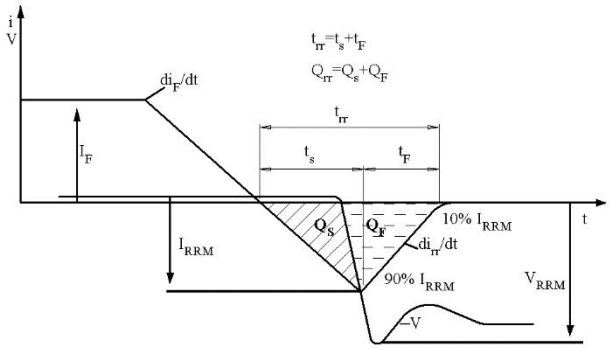
3. Unclamped Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics

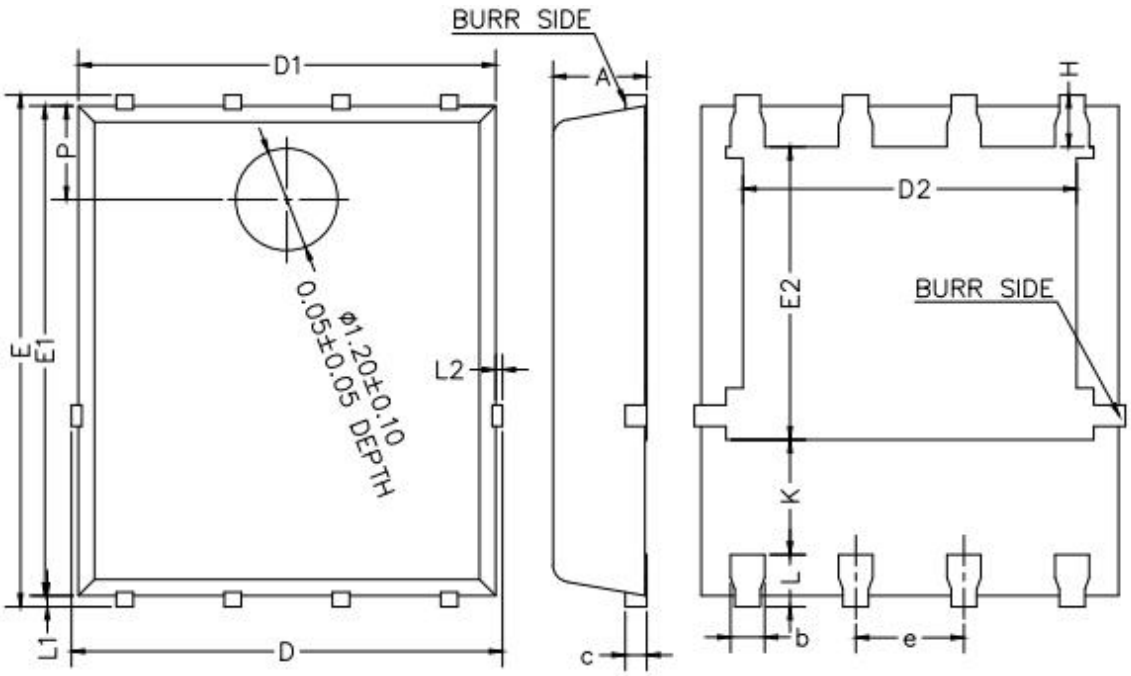




7mΩ, 100V, N-Channel Power MOSFET SRT10N070H

Mechanical Dimensions

DFN5*6-8 **Unit: mm**



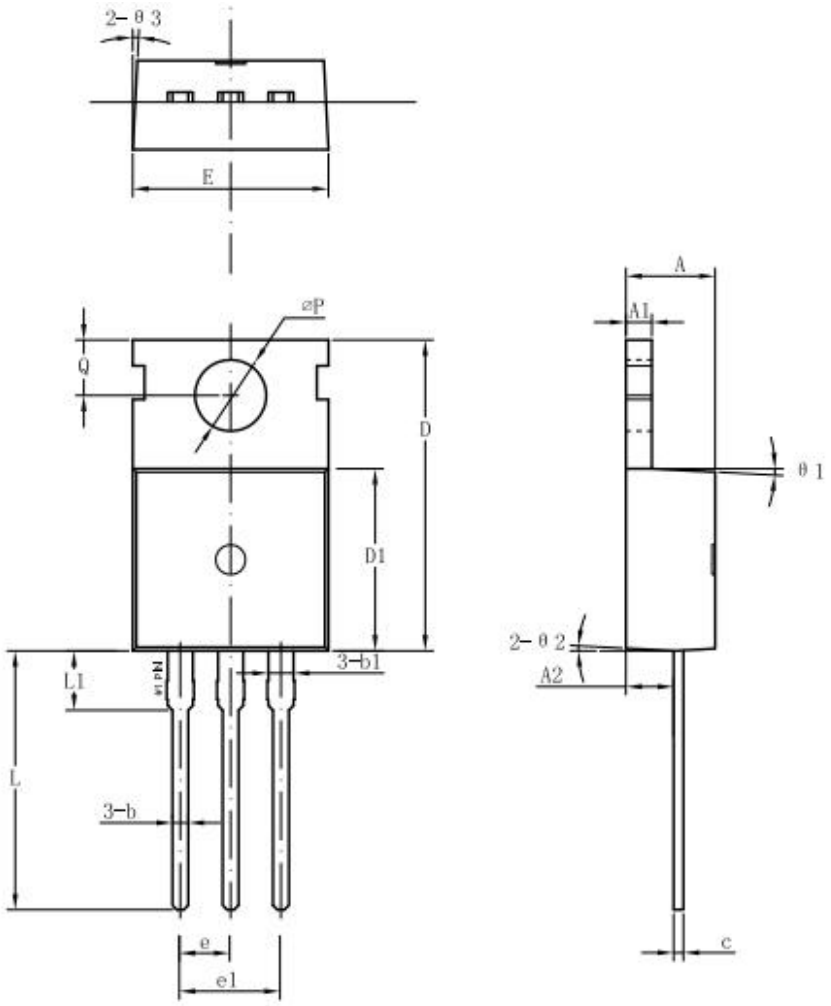
Symbol	Dimensions (mm)			Symbol	Dimensions (mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.90	1.10	1.20	E2	3.18	-	3.54
b	0.35	0.40	0.45	H	0.51	0.61	0.71
c	0.21	0.25	0.34	K	1.10	-	-
D	-	-	5.10	L	0.51	0.61	0.71
D1	4.80	4.90	5.00	L1	0.06	0.13	0.20
D2	3.82	-	4.11	L2	-	-	0.10
e	1.17	1.27	1.37	P	1.00	1.10	1.20
E	5.90	6.00	6.10	θ	8°	10°	12°
E1	5.70	5.75	5.80				

7mΩ, 100V, N-Channel Power MOSFET SRT10N070H

Mechanical Dimensions

TO-220C(SRT10N022HTC-G/E)

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°	-

7mΩ, 100V, N-Channel Power MOSFET SRT10N070H

Sanrise Technology Limited Company

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