

General Description

The Sanrise SRT10N070L 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 SRT10N070L break down voltage is 100V and it has a high rugged avalanche characteristics. The SRT10N070L is available in PDFN5*6 package.

Features

- Ultra Low $R_{DS(ON)}$ TYP = 5.2mΩ@ $V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g=38.9nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- Non-automotive Qualified

Application

- Charger / Adapter
- PD
- High Power Supply
- E-Tools

Symbol

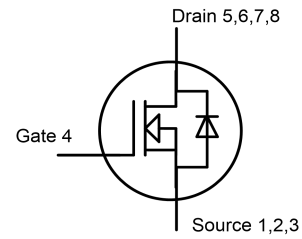
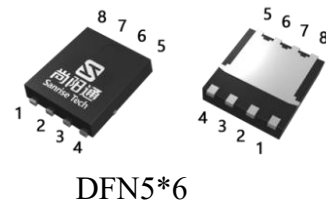


Figure 1 Symbol of SRT10N070L

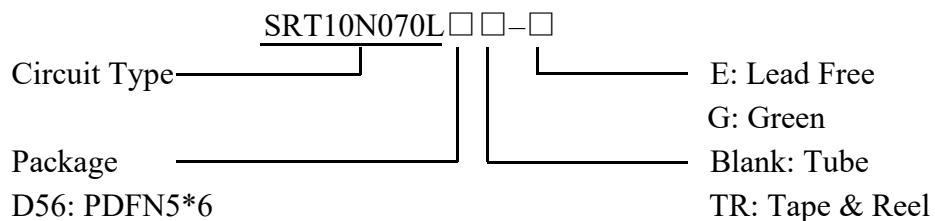
Package Type



DFN5*6

Figure 2 Package Type of SRT10N070L

Ordering Information



Package	Part Number	Marking ID	Packing Type
PDFN5*6	SRT10N070LD56TR-G	SRT10N070LD56G	Tape & Reel

7mΩ, 100V, N-Channel Power MOSFET
SRT10N070L

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	84	A
	$T_C=100^{\circ}\text{C}$		53	
Pulsed Drain Current (Note 2)		I_{DM}	336	A
Power Dissipation ($T_C = 25^{\circ}\text{C}$)		P_D	96	W
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	36	mJ
Avalanche Destructive Energy, Single Pulse (Note 4)		E_{AS_Limit}	256	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.04	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	18	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	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	-55 to 150	$^{\circ}\text{C}$
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	$^{\circ}\text{C}$

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. $I_{AS} = 12.0\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$
4. $I_{AS_Limit} = 32\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}			1.3	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}			50	$^{\circ}\text{C}/\text{W}$

7mΩ, 100V, N-Channel Power MOSFET
SRT10N070L
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	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	1.2	1.8	2.4	V
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =4.5V, I _D =20A		7.0	10.0	mΩ
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =30A		5.2	7.0	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain		1.4		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =50V, V _{GS} =0V, f=1MHz		2.5		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		6.5		nS
Rise Time		t _r			4.8		
Turn-off Delay Time		t _{d(off)}			22.7		
Fall Time		t _f			7.0		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =50V, I _D =30A V _{GS} =0 to 4.5V		8.4		nC
Gate to Drain Charge		Q _{gd}			6.8		
Gate Charge Total		Q _g			19.3		
Gate Charge Total		Q _g	V _{DD} =50V, I _D =30A V _{GS} =0 to 10V		38.9		nC
Gate Charge Total, sync FET		Q _g	V _{DD} =0.1V, V _{GS} =0 to 10V		34.6		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		26		nS
Reverse Recovery Charge		Q _{rr}			21		nC
Peak Reverse Recovery Current		I _{rrm}			1.6		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 80V
- $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80V

Typical Performance Characteristics

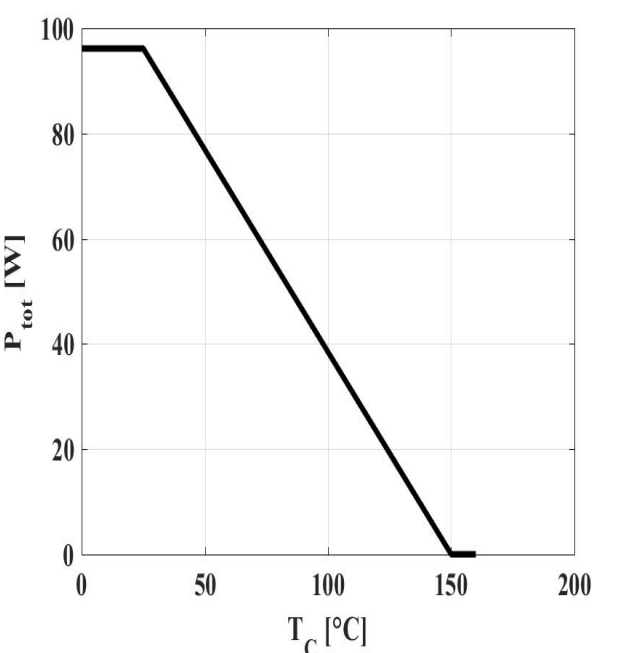
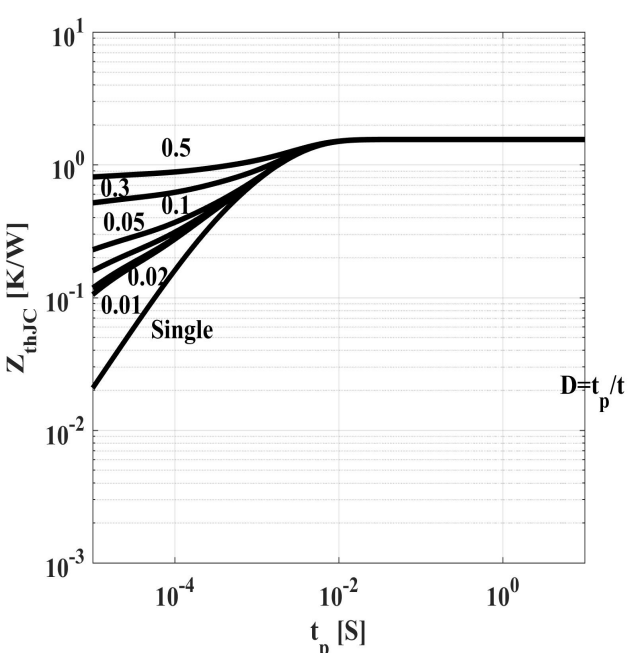
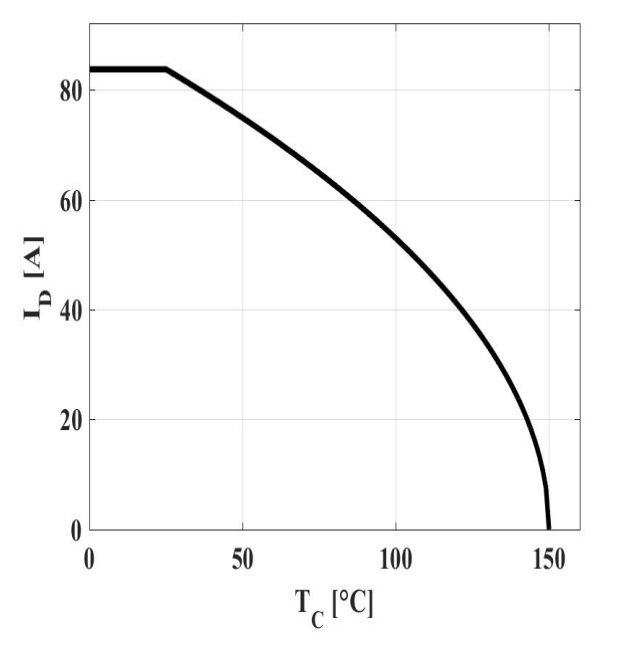
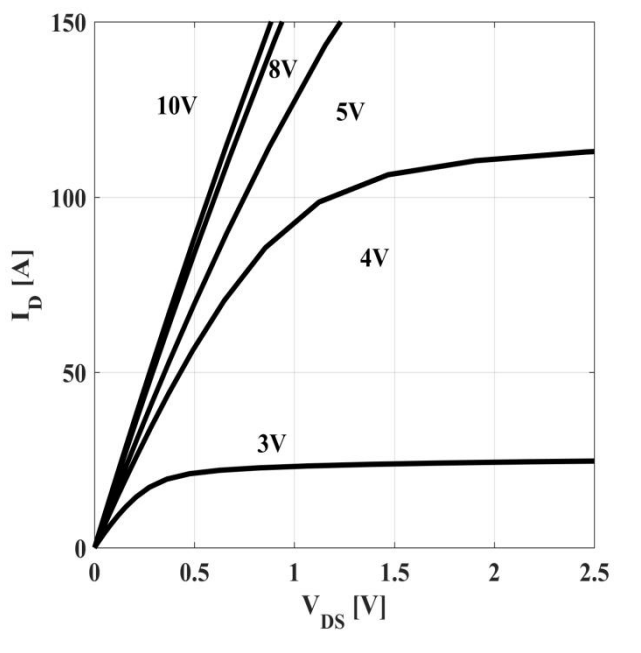
Figure 3: Power Dissipation  $P_{tot}=f(T_c)$	Figure 4: Max. Transient Thermal Impedance  $Z_{(thJC)}=f(t_p)$; parameter: $D=t_p/T$
Figure5: Drain Current  $I_D=f(T_c); V_{GS} \geq 10V$	Figure6: Typ. Output Characteristics  $I_D=f(V_{DS}); T_j=25^{\circ}C$; parameter: V_{GS}

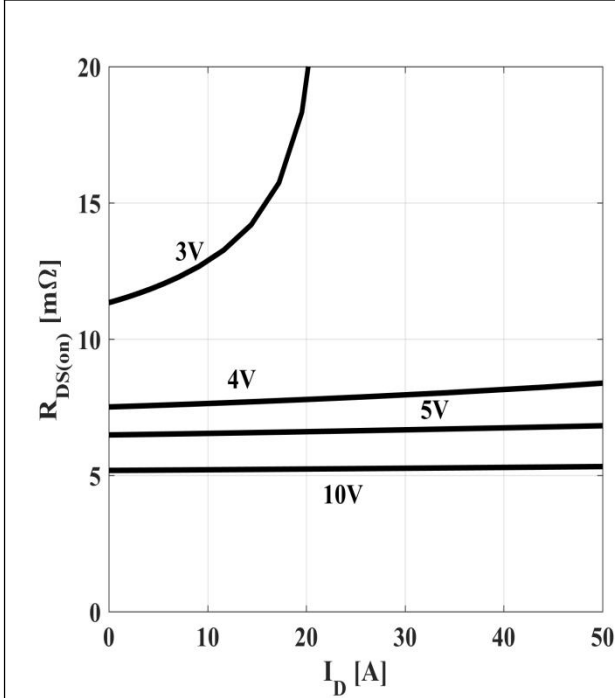
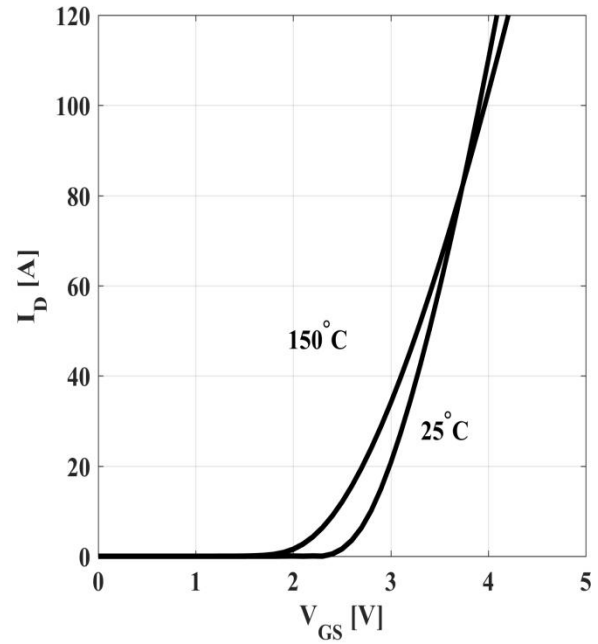
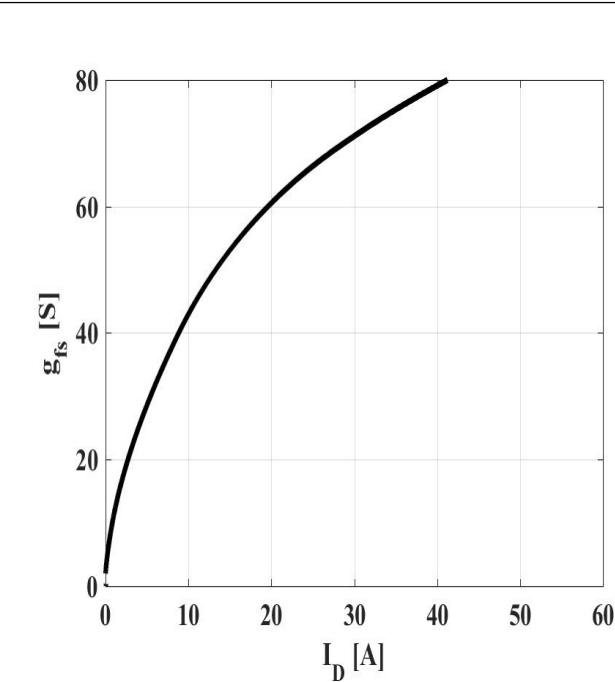
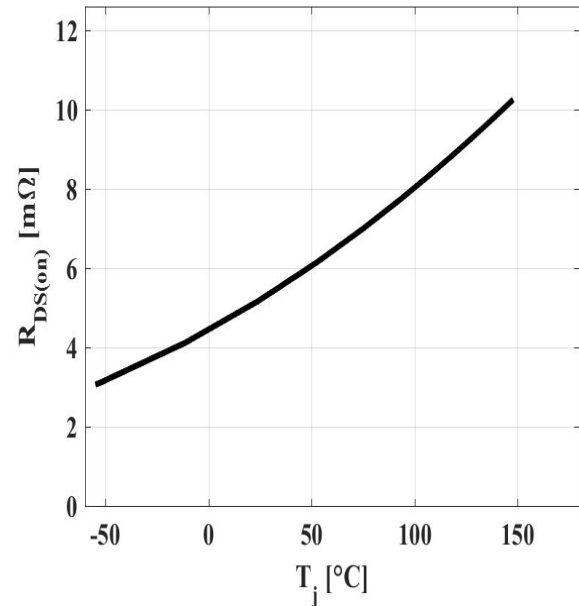
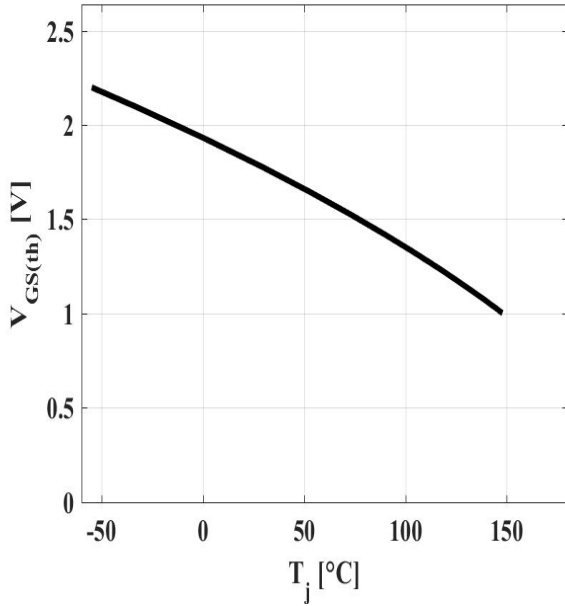
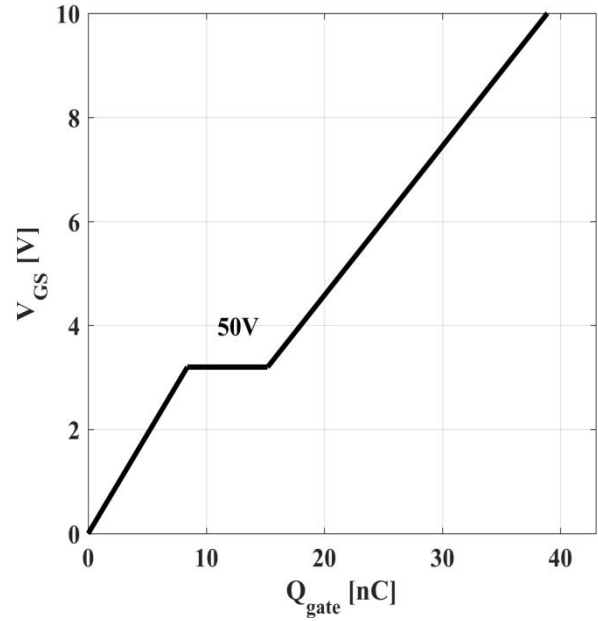
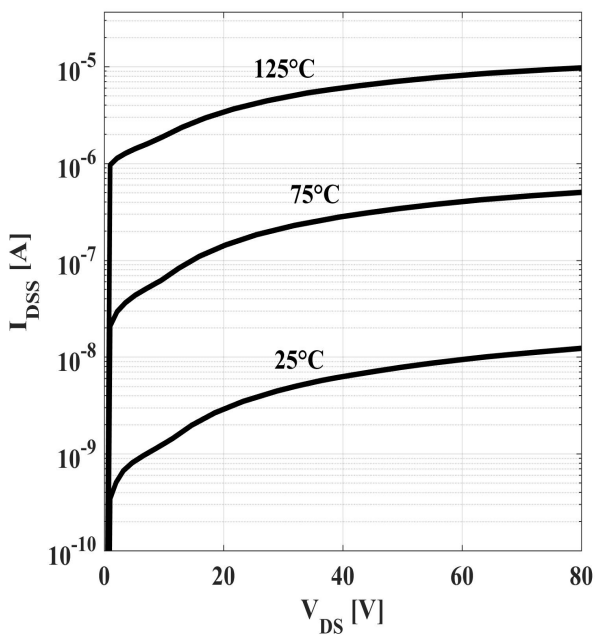
Figure7: Typ. Drain-Source On-State Resistance

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

 $R_{DS(ON)}=f(T_j); I_D=30\text{A}; V_{GS}=10\text{V}$

Figure 11: Typ. Gate Threshold Voltage


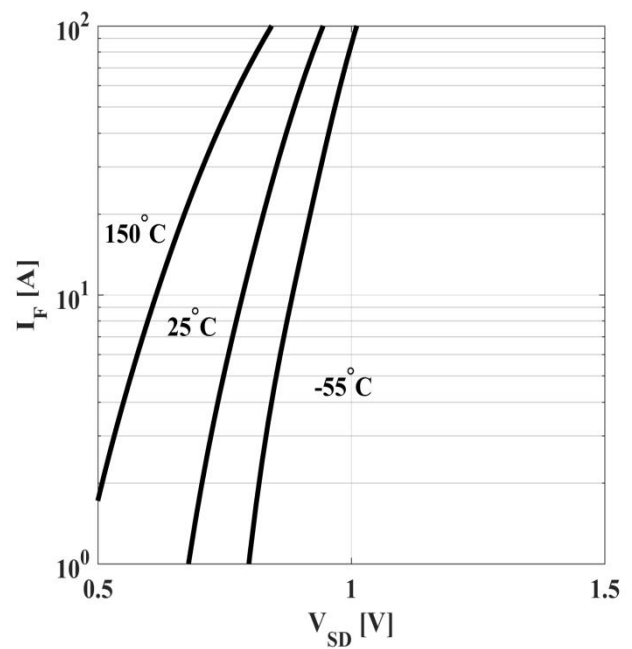
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_{DS} = 250\mu A$$

Figure 12: Typ. Gate Charge


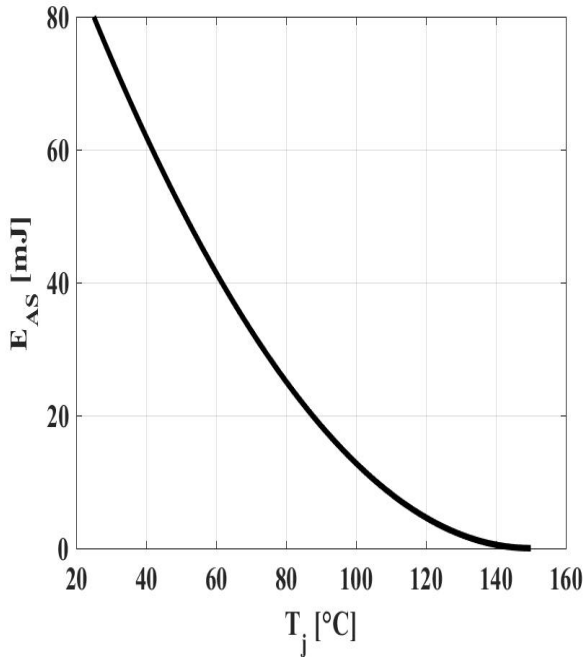
$$V_{GS} = f(Q_{gate}), I_D = 20A \text{ pulsed}$$

Figure 13: Drain-Source Leakage Current


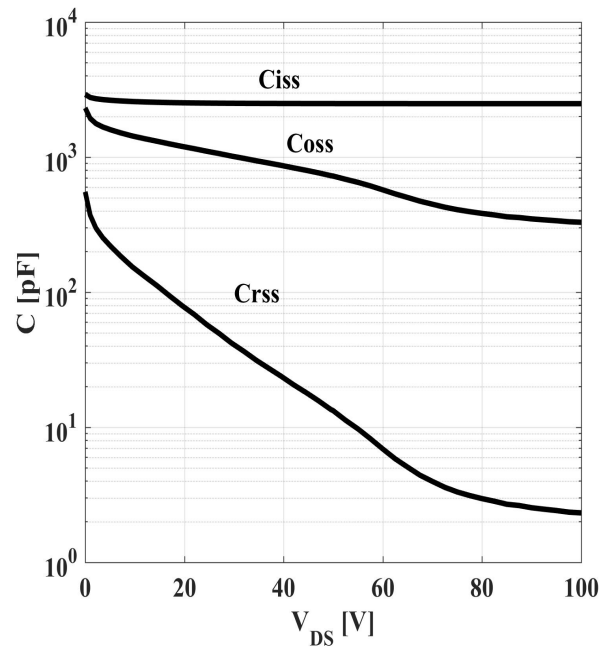
$$I_{DSS} = f(V_{DS}); V_{GS} = 0V; \text{parameter: } T_j$$

Figure 14: Forward Characteristics of Reverse Diode


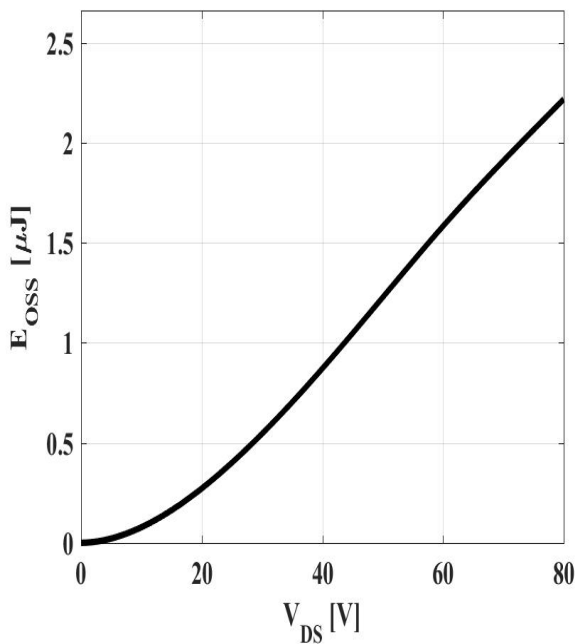
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


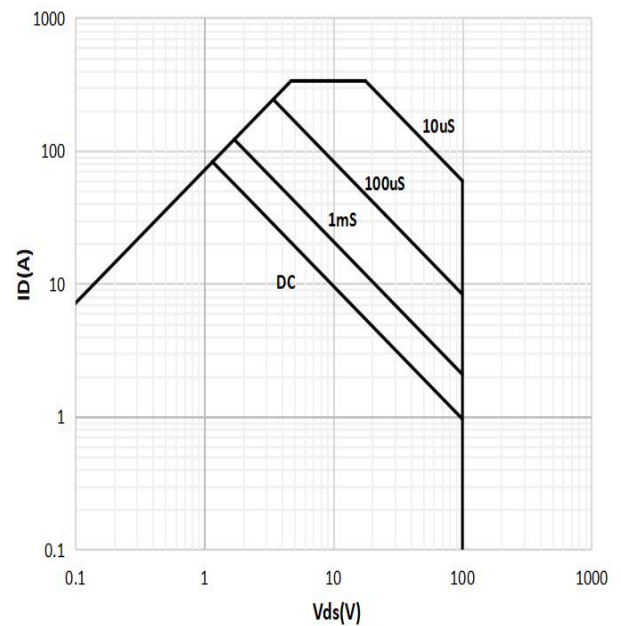
$$E_{AS}=f(T_j); I_D=12.0A; V_{DD}=50V$$

Figure 16: Typ. Capacitances


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

Figure 17: Coss Stored Energy


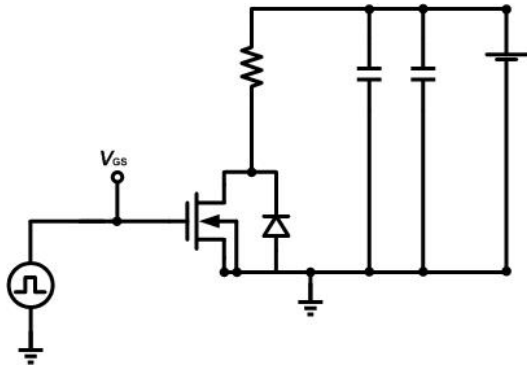
$$E_{OSS}=f(V_{DS})$$

Figure 18: Safe Operating Area


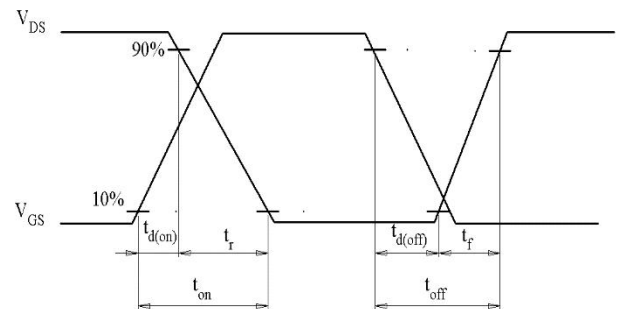
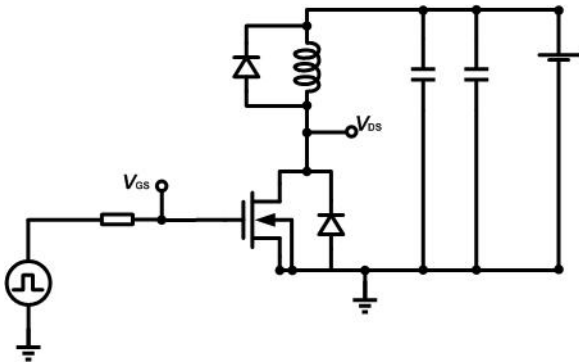
$$I_D = f(V_{DS}); T_c = 25^\circ C; V_{GS} > 7V; \text{parameter } t_p$$

Test Circuits

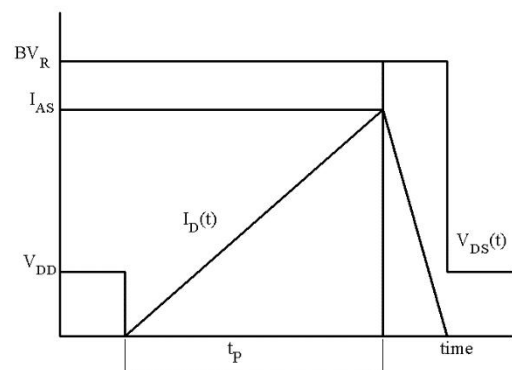
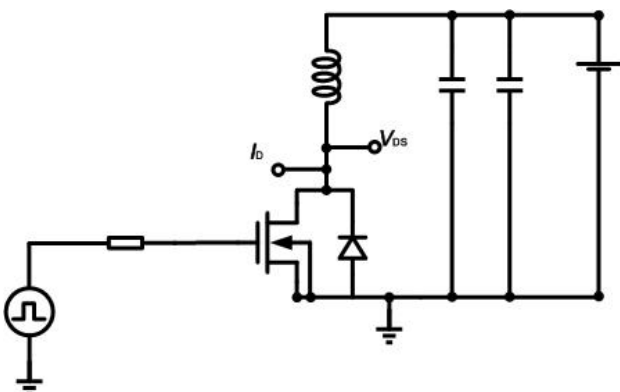
1. Gate Charge Test Circuit & Waveform



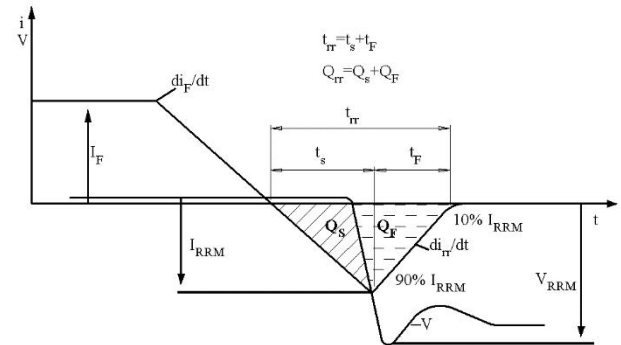
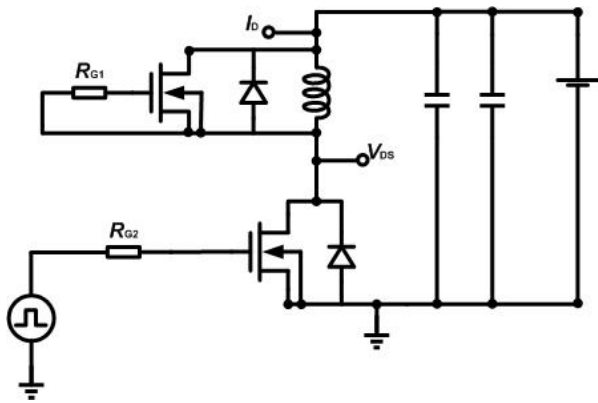
2. Switch Time Test Circuit

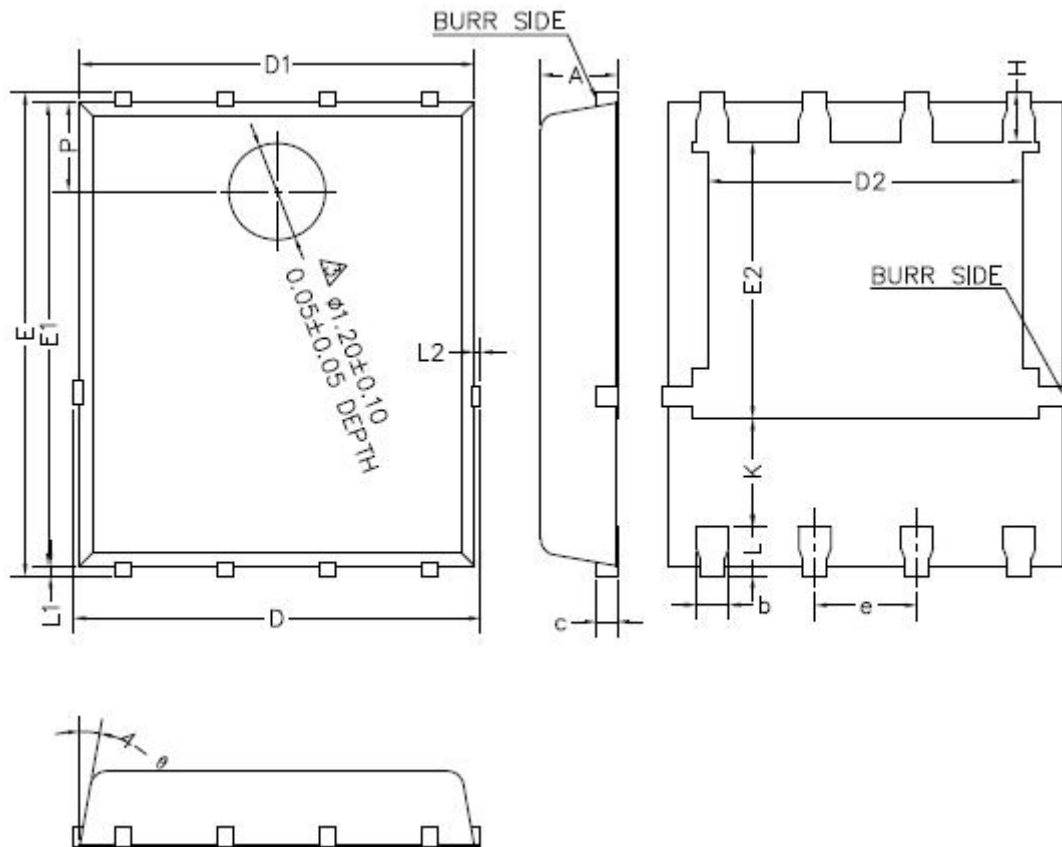


3. Unclamped Inductive Switching Test Circuit & Waveforms



4. Test Circuit and Waveform for Diode Characteristics



Mechanical Dimensions
PDFN5*6
Unit: mm


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	0.90	1.10	1.20
b	0.35	0.40	0.45
c	0.21	0.25	0.34
D			5.10
D1	4.80	4.90	5.00
D2	3.91	4.01	4.11
e	1.17	1.27	1.37
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.34	3.44	3.54
H	0.51	0.61	0.71
K	1.10		
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
L2			0.10
P	1.00	1.10	1.20
θ	8°	10°	12°



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