

General Description

The Sanrise SRT045N025H 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 SRT045N025H break down voltage is 45V and it has a high rugged avalanche characteristics. The SRT045N025H is available in PDFN5*6 and TO-220C packages.

Features

- Ultra Low
 $R_{DS(ON_TYP)} = 2.15m\Omega$, PDFN56 @ $V_{GS} = 10V$.
 $R_{DS(ON_TYP)} = 2.65m\Omega$, TO-220C @ $V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 32nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved

Application

- Server/Telecom
- High Power Supply
- E-Tools
- Motor Driver
- BMS

Symbol

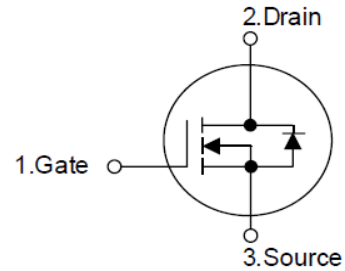


Figure 1 Symbol of SRT045N025H

Package Type

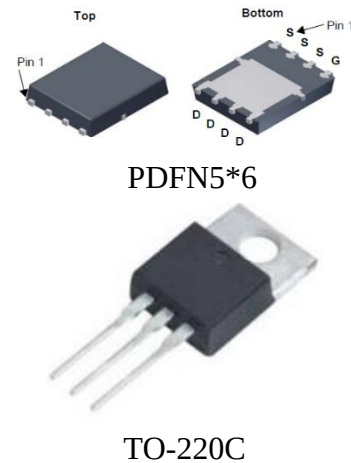


Figure 2 Package Type of SRT045N025H

2.5mΩ, 45V, N-Channel Power MOSFET**SRT045N025H****Ordering Information**

SRT045N025H□□

Circuit Type _____

Package _____

D56: PDFN5*6 Blank: Tube

TC: TO-220C TR: Tape & Reel

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
PDFN5*6	SRT045N025HD56TR	SRT045N025HD56TR	SRT045N025HD56	SRT045N025HD56	Tape & Reel
TO-220C	SRT045N025HTC	SRT045N025HTC	SRT045N025HTC	SRT045N025HTC	Tape & Reel

2.5mΩ, 45V, N-Channel Power MOSFET
SRT045N025H

Absolute Maximum Ratings

Parameter		Symbol	Rating		Unit
Drain-Source Voltage		V _{DSS}	45		V
Gate-Source Voltage		V _{GSS}	±20		V
Continuous Drain Current, Package Limited	T _C =25°C	I _D	PDFN56	80	A
			TO220C	60	
	T _C =125°C		PDFN56	58	
			TO220C	63	
Continuous Drain Current, Silicon	T _C =25°C		129		
Pulsed Drain Current (Note 2)		I _{DM}	240		A
Avalanche Energy, Single Pulse (Note 3)		E _{AS}	155		mJ
Avalanche Energy, Repetitive (Note 2)		E _{AR}	0.2		mJ
Avalanche Current, Repetitive (Note 2)		I _{AR}	20.0		A
Continuous Diode Forward Current		I _S	80		A
Diode Pulse Current		I _{S,PULSE}	240		A
Operating Junction Temperature		T _J	150		°C
Storage Temperature		T _{STG}	-55 to 150		°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. $I_{AS}= 20.0\text{A}$, $V_{DD}= 20\text{V}$, $R_G= 25\Omega$, Starting $T_J= 25^{\circ}\text{C}$

Thermal Resistance

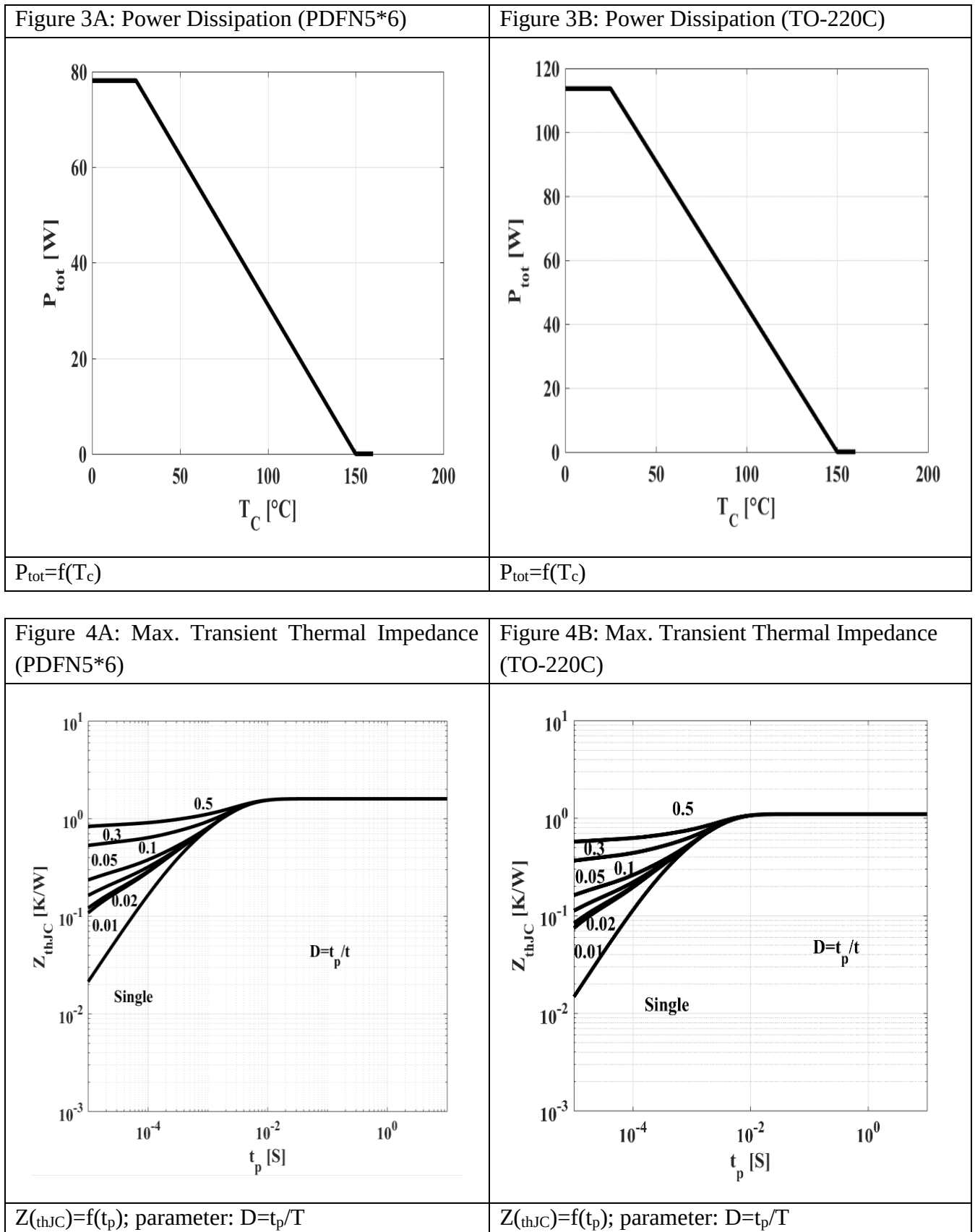
Parameter		Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	PDFN5*6	R_{thJC}			1.6	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	PDFN5*6	R_{thJA}			50	
Thermal Resistance, Junction-to-Case	TO220C	R_{thJC}			1.1	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	TO220C	R_{thJA}			62	

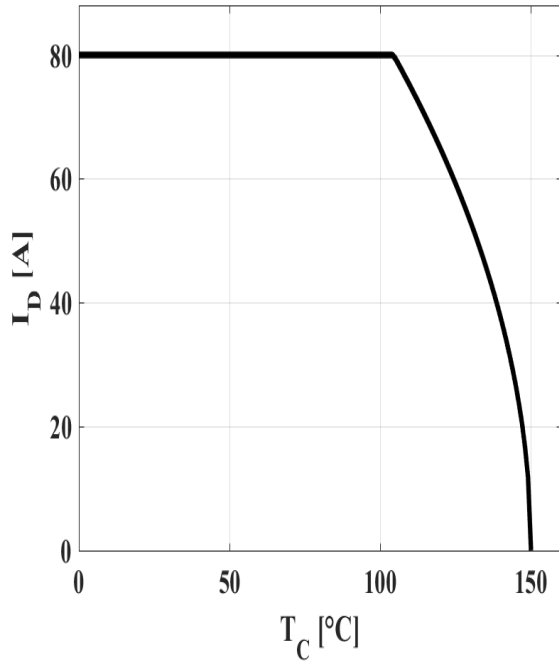
2.5mΩ, 45V, N-Channel Power MOSFET
SRT045N025H
Electrical Characteristics
 $T_J = 25^{\circ}\text{C}$, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250uA	45			V
Zero Gate Voltage Drain Current		I _{DSS}	V _{DS} =45V, V _{GS} =0V			1	uA
Gate-Body Leakage Current	Forward	I _{GSSF}	V _{GS} =20V, V _{DS} =0V			200	nA
	Reverse	I _{GSSR}	V _{GS} =-20V, V _{DS} =0V			-200	
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 =35A		2.15	2.5	mΩ
	TO-220C				2.65	3.2	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain		1.2		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =20V, V _{GS} =0V, f=1MHz		2.3		nF
Output Capacitance		C _{OSS}			762		pF
Reverse Transfer Capacitance		C _{RSS}			48		pF
Effective output capacitance, energy related ^{NOTE5}		C _{O(er)}	V _{GS} =0V, V _{DS} =0...20V		1.2		nF
Effective output capacitance, time related ^{NOTE6}		C _{O(tr)}			1.5		
Turn-on Delay Time		t _{d(on)}	V _{DD} =20V, I _D =35A R _G =1.6Ω, V _{GS} =10V		8		ns
Rise Time		t _r			29		
Turn-off Delay Time		t _{d(off)}			31		
Fall Time		t _f			7		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =20V, I _D =35A V _{GS} =0 to 10V		10.2		nC
Gate to Drain Charge		Q _{gd}			5.2		
Gate Charge Total		Q _g			32		
Gate Plateau Voltage		V _{plateau}			5.0		V
Gate Charge Total, sync FET		Q _g	V _{DD} =0.1V, V _{GS} =0 to 10V		29		nC
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _{SD} =35A		0.84	1.0	V
Reverse Recovery Time		t _{rr}	V _R =20V, I _F =35A dI _F /dt=100A/us		52		ns
Reverse Recovery Charge		Q _{rr}			91		nC
Peak Reverse Recovery Current		I _{rrm}			3.5		A

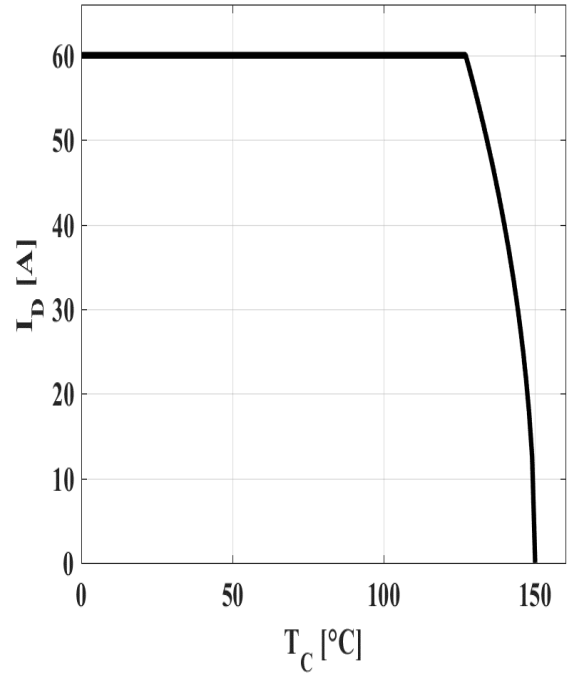
Note:

- $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 32V
- $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 32 V

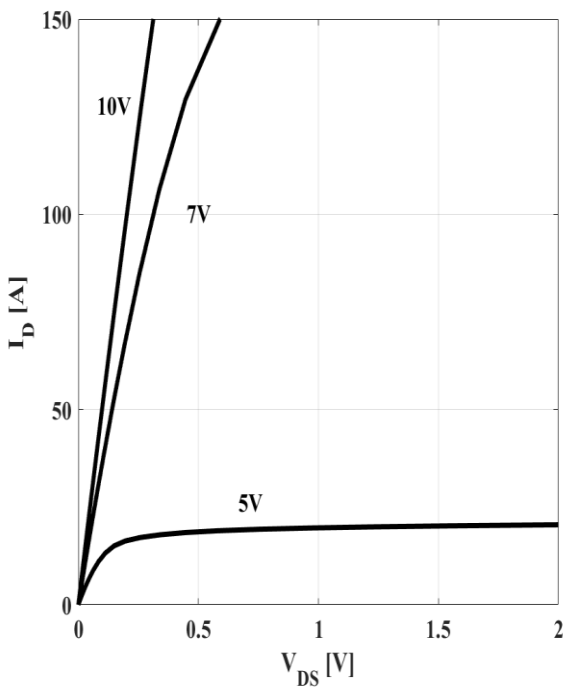
Typical Performance Characteristics


2.5mΩ, 45V, N-Channel Power MOSFET
SRT045N025H
Figure5A: Drain Current(PDFN5*6)


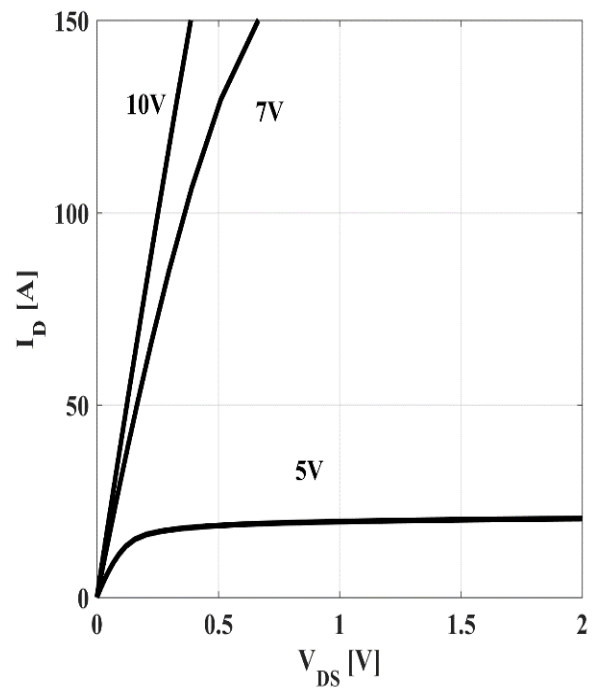
$$I_D = f(T_C); V_{GS} \geq 10V$$

Figure5B: Drain Current(TO-220C)


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

Figure6A: Typ. Output Characteristics (PDFN5*6)


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

Figure6B: Typ. Output Characteristics (TO-220C)


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

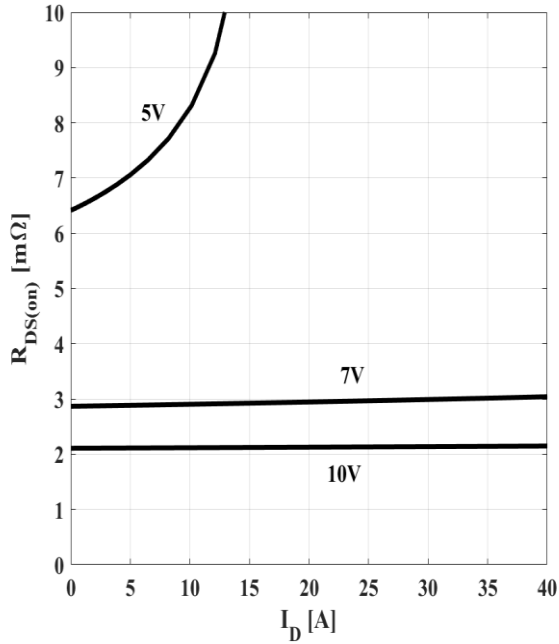
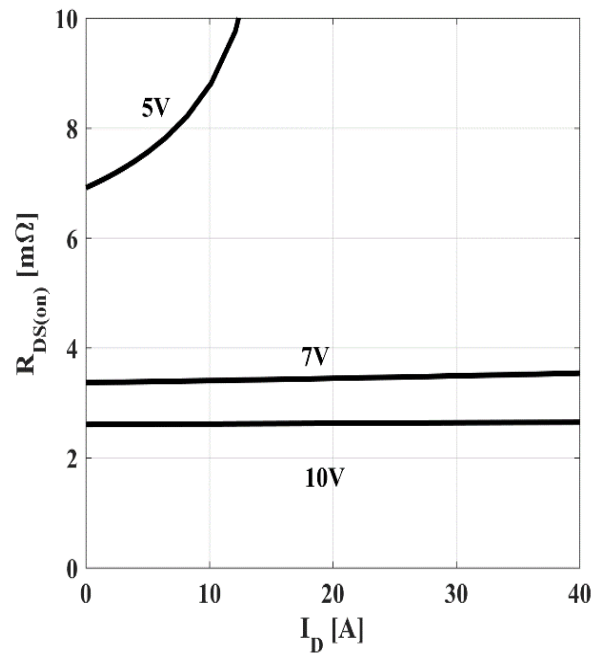
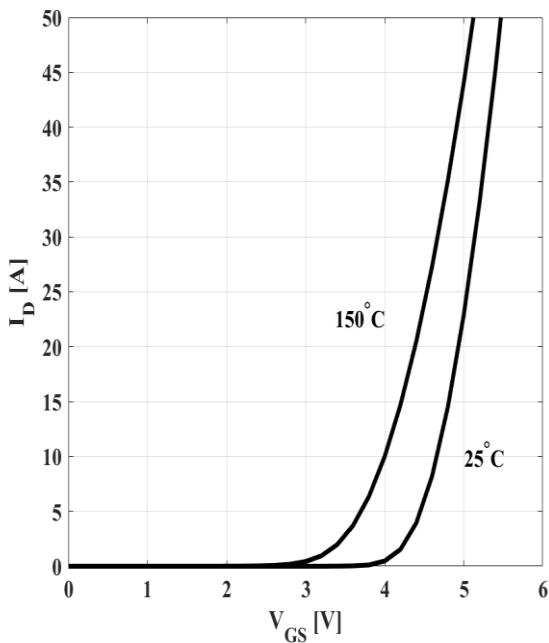
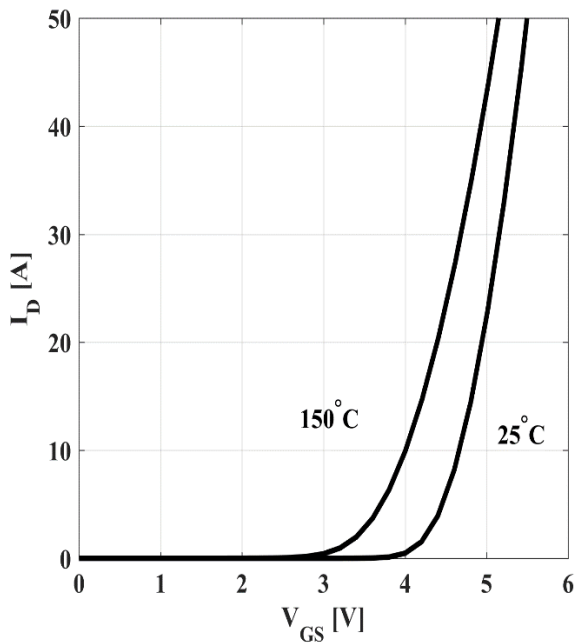
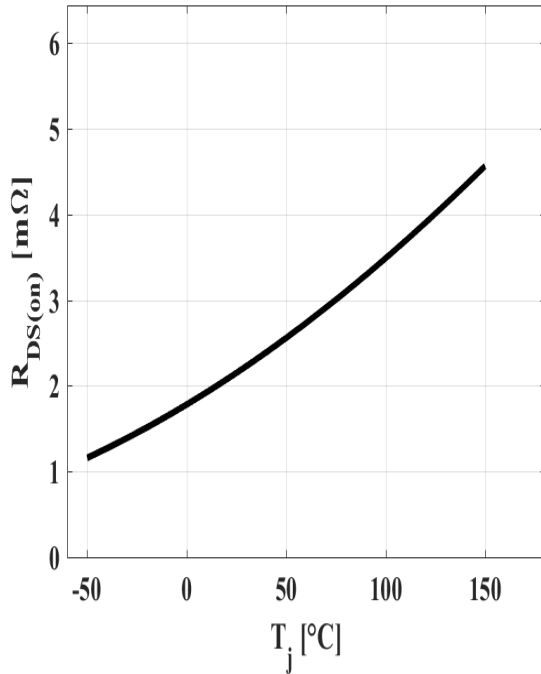
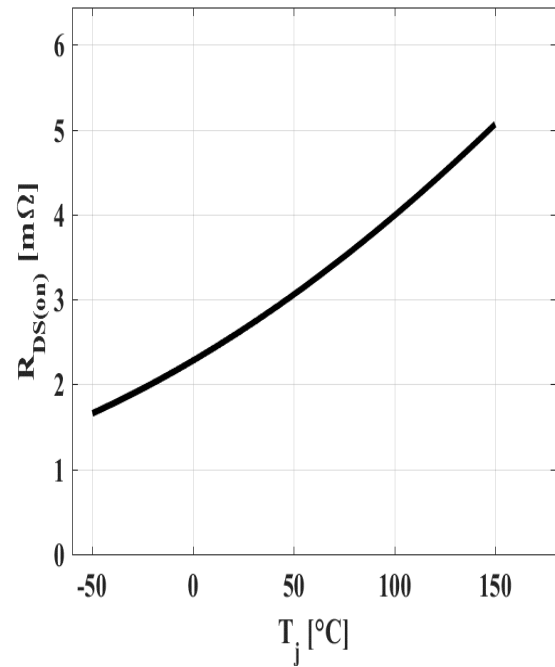
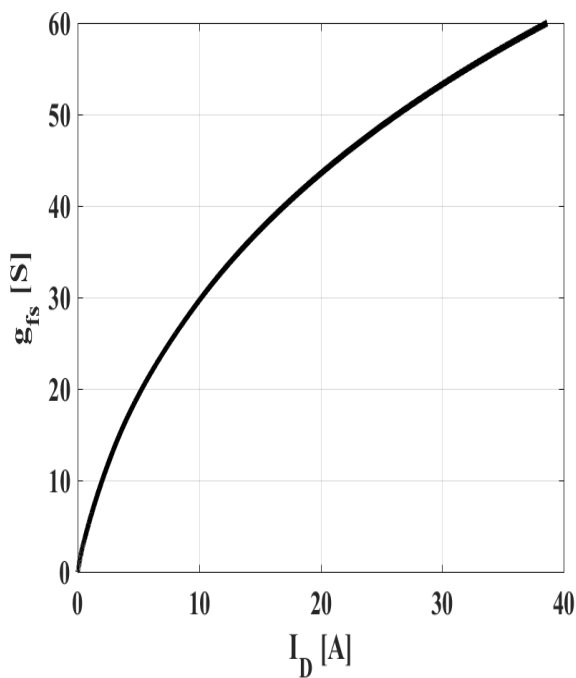
2.5mΩ, 45V, N-Channel Power MOSFET
SRT045N025H
Figure7A: Typ. Drain-Source On-State Resistance(PDFN5*6)

 $R_{DS(ON)}=f(I_D); T_j=25^{\circ}\text{C}; \text{parameter: } V_{GS}$
Figure7B: Typ. Drain-Source On-State Resistance(TO-220C)

 $R_{DS(ON)}=f(I_D); T_j=25^{\circ}\text{C}; \text{parameter: } V_{GS}$
Figure8A: Typ. Transfer Characteristics (PDFN5*6)

 $I_D=f(V_{GS}); |V_{DS}|>2|I_D|R_{DS(on)max}; \text{parameter: } T_j$
Figure8B: Typ. Transfer Characteristics (TO-220C)

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

Figure9A: Typ. Drain-Source On-State Resistance (PDFN5*6)


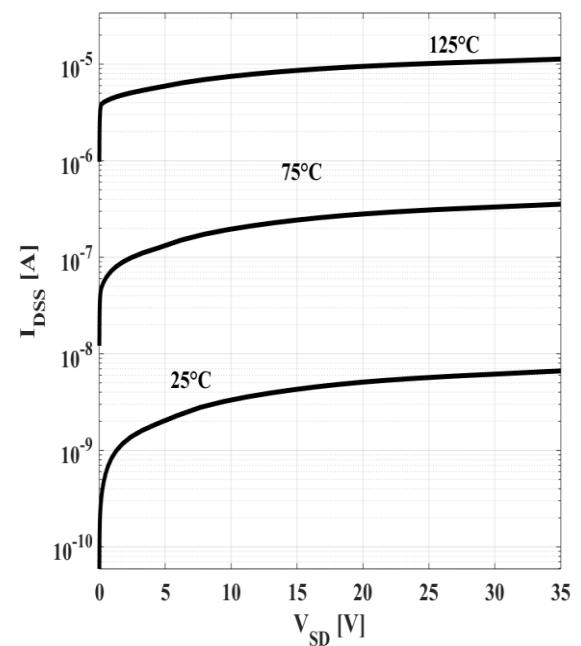
$$R_{DS(ON)}=f(T_j); I_D=35A; V_{GS}=10V$$

Figure9B: Typ. Drain-Source On-State Resistance (TO-220C)


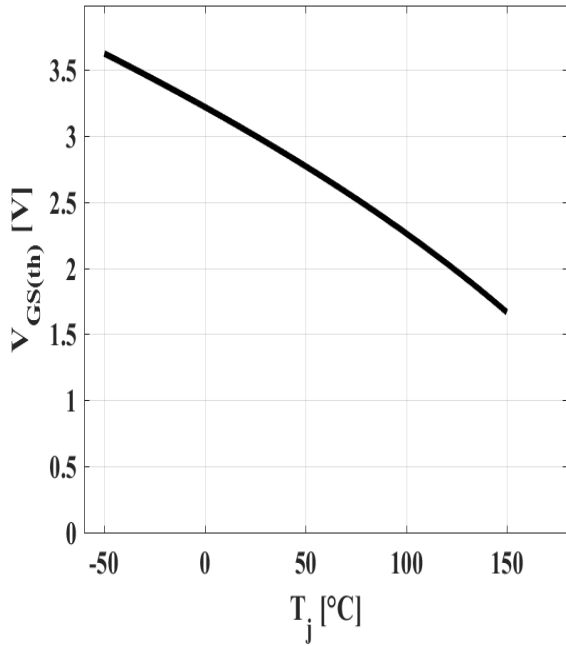
$$R_{DS(ON)}=f(T_j); I_D=35A; V_{GS}=10V$$

Figure10: Typ. Forward Transconductance


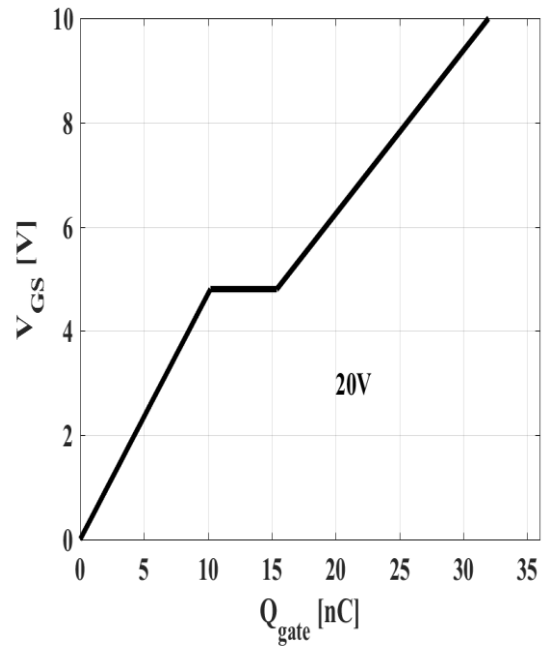
$$g_{fs}=f(I_D); T_j=25^{\circ}C$$

Figure 11: Drain-Source Leakage Current


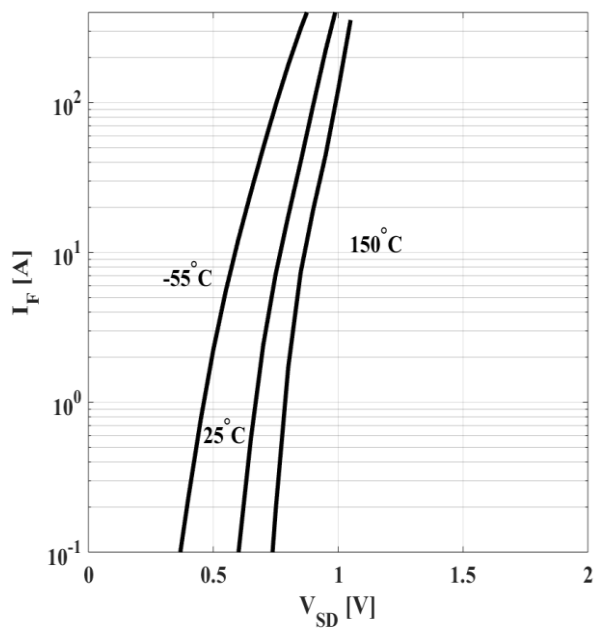
$$I_{DSS}=f(V_{DS}); V_{GS}=0V; \text{parameter: } T_j$$

Figure12: Typ. Gate Threshold Voltage


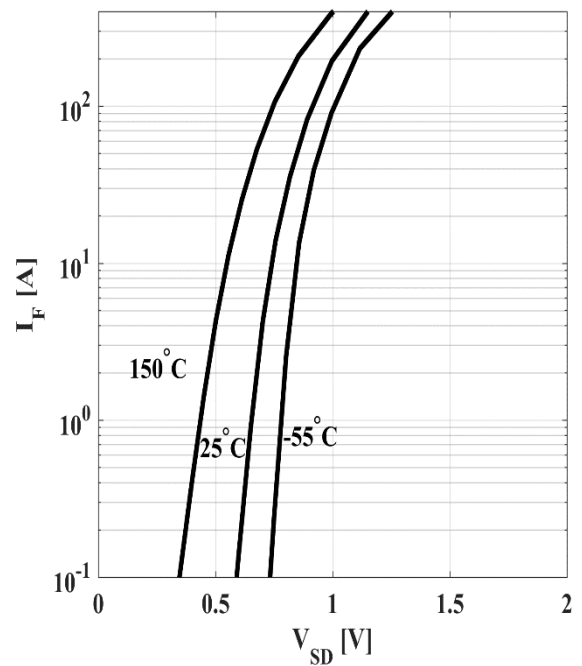
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_{DS} = 250\mu A$$

Figure 13: Typ. Gate Charge


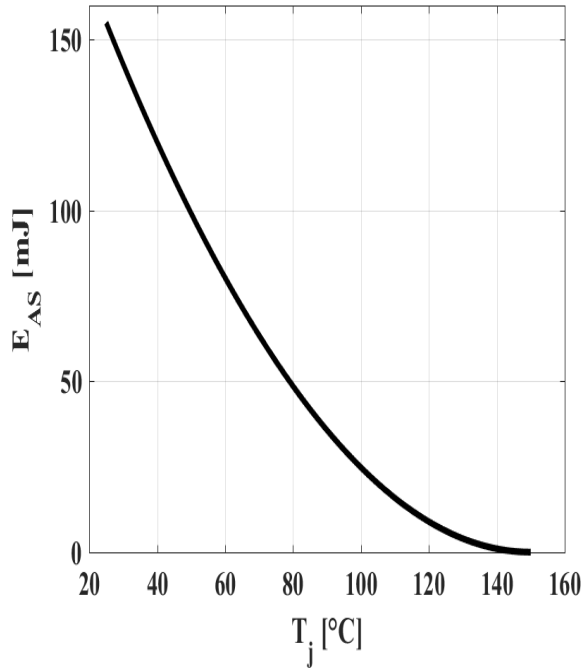
$$V_{GS} = f(Q_{gate}), I_D = 35A \text{ pulsed}$$

Figure 14A: Forward Characteristics of Reverse Diode (PDFN5*6)


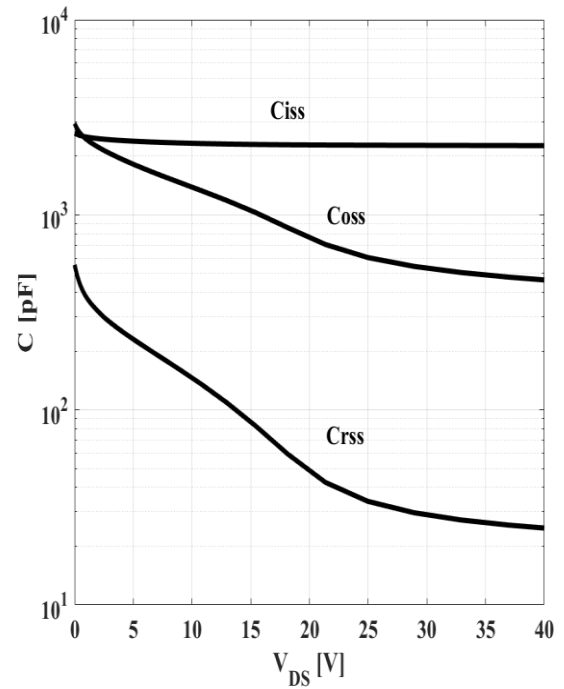
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 14B: Forward Characteristics of Reverse Diode (TO-220C)


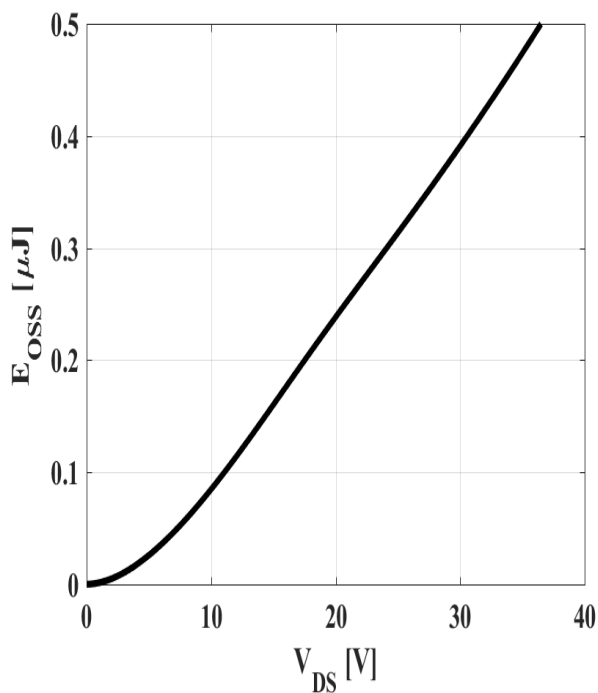
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


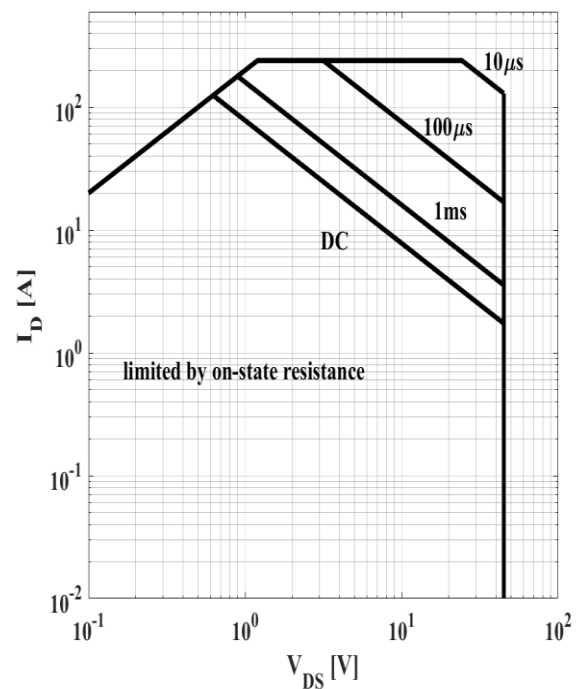
$$E_{AS}=f(T_j); I_D=20.0A; V_{DD}=20V$$

Figure 16: Typ. Capacitances


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

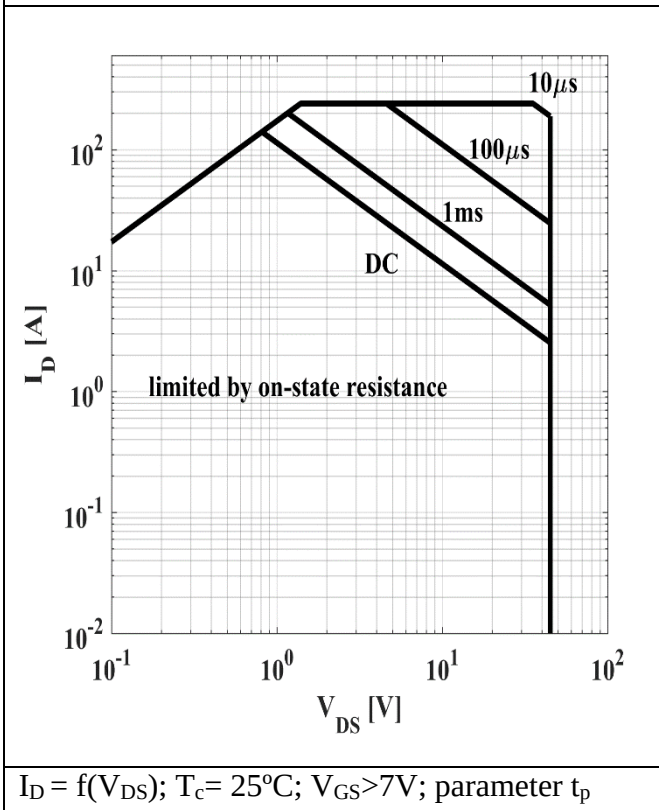
Figure 17: Coss Stored Energy


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

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


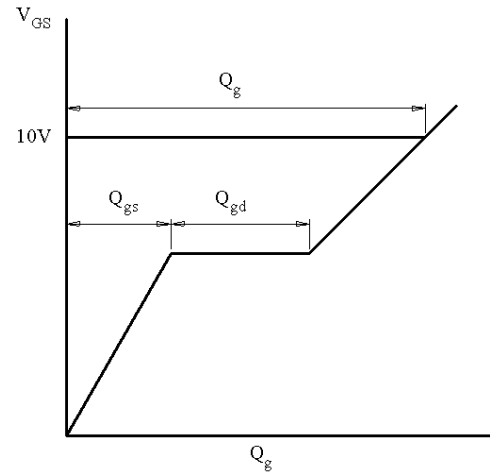
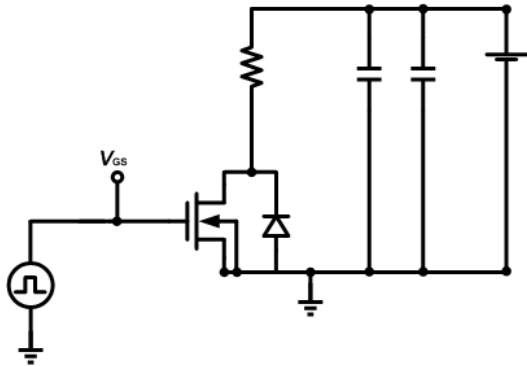
$$I_D = f(V_{DS}); T_c = 25^\circ C; V_{GS} > 7V; \text{parameter } t_p$$

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

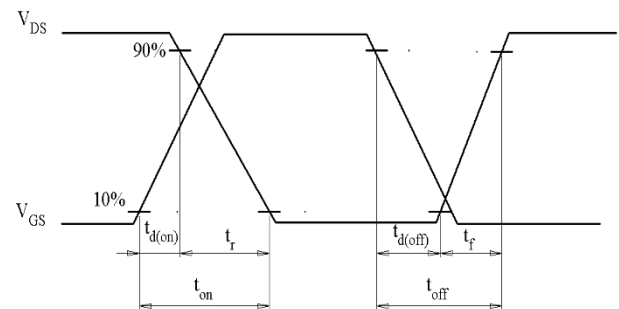
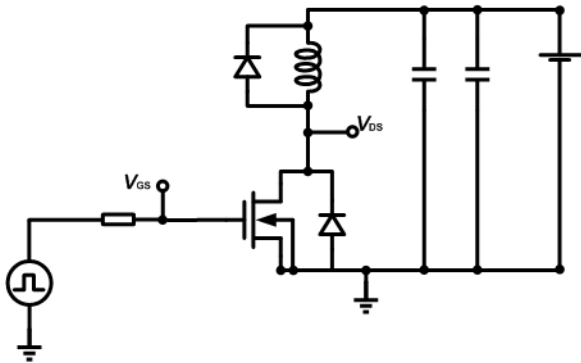


Test Circuits

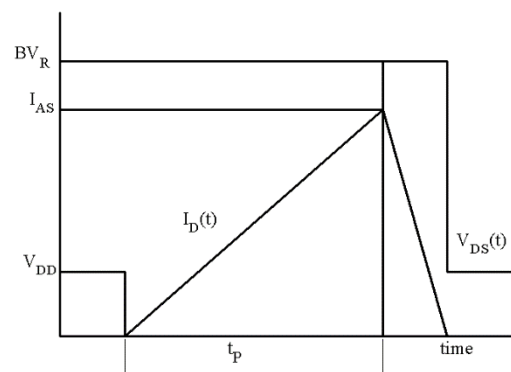
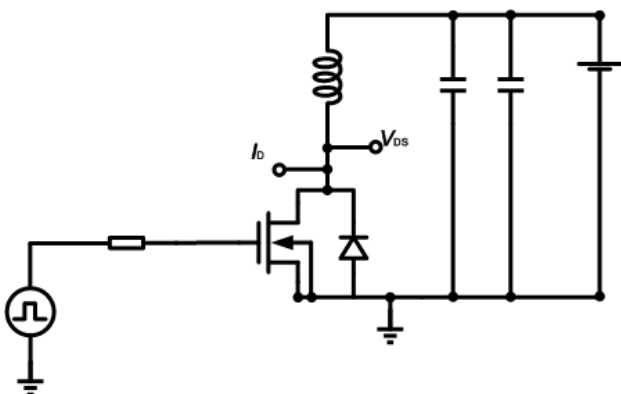
1. Gate Charge Test Circuit & Waveform



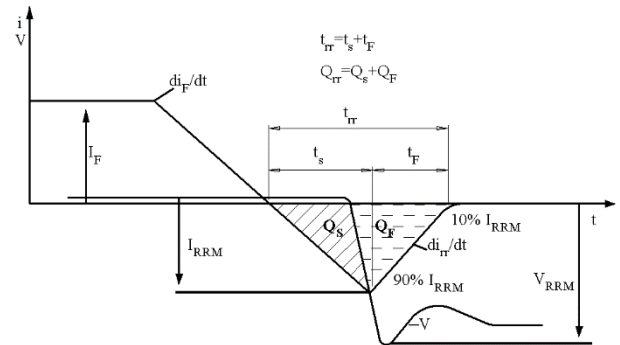
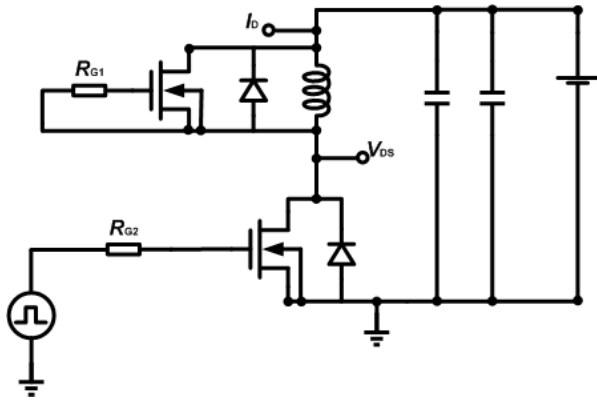
2. Switch Time Test Circuit

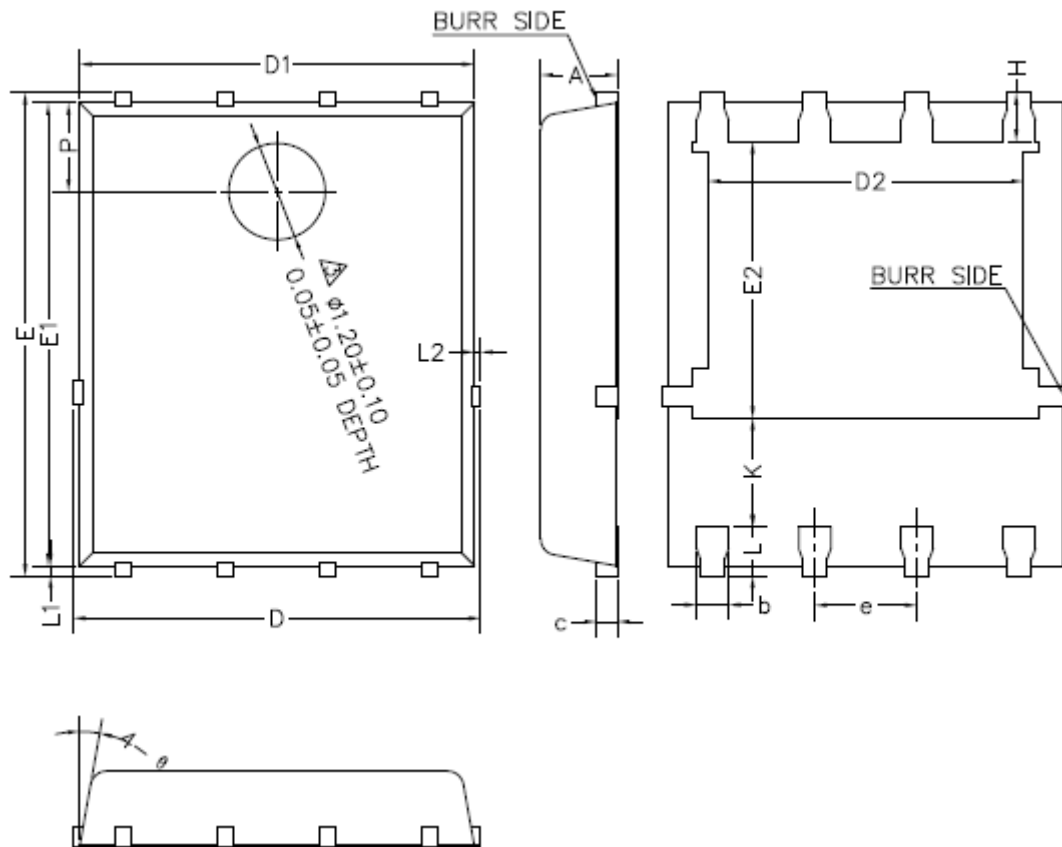


3. Unclamped Inductive Switching Test Circuit & Waveforms

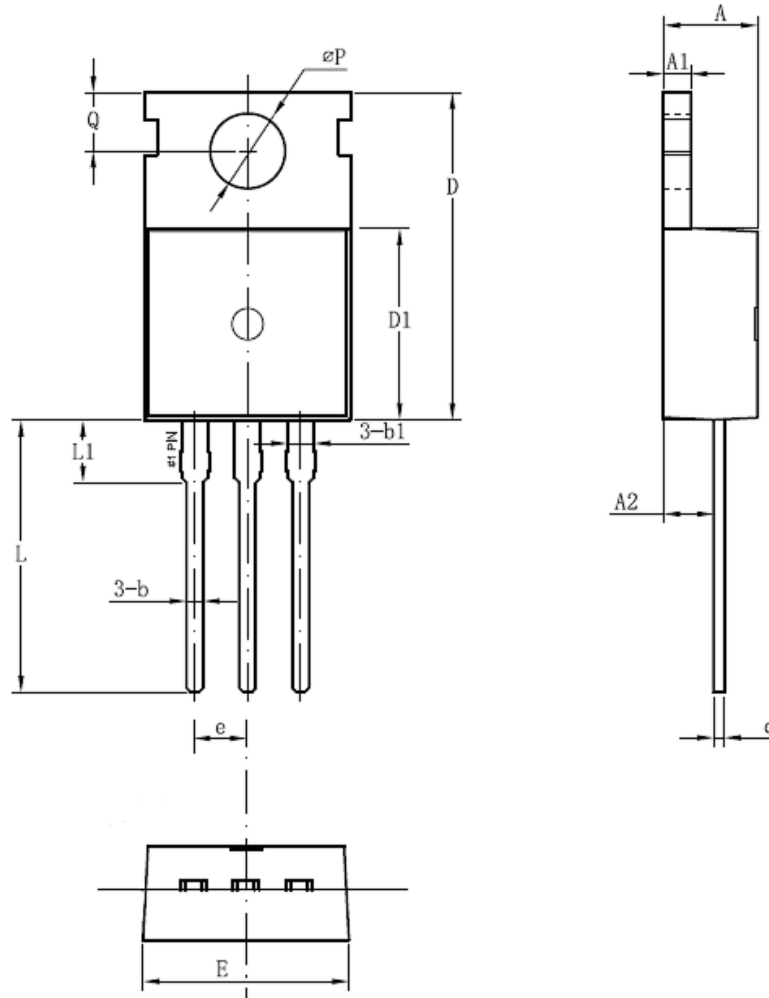


4. Test Circuit and Waveform for Diode Characteristics



Mechanical Dimensions
PDFN5*6-8
Unit: mm


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	1.0	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°

Mechanical Dimensions (Continued)
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



Sanrise Technology Limited Company

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