230mΩ, 650V, Super Junction N-Channel Power MOSFET SRC65R230BS

General Description

The Sanrise SRC65R230BS is a high voltage power MOSFET, fabricated using advanced super junction 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 outstanding efficiency.

The SRC65R230BS break down voltage is 650V and it has a high rugged avalanche characteristics. The SRC65R230BS is available in PDFN8*8-4 package.

Features

- Ultra Low $R_{DS(ON)}$ = 230mΩ @ V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=38.4nC typ.
- Intrinsic Fast-Recovery Body Diode
- Fast switching capability
- Robust design with better EAS performance
- Non-automotive Qualified
- Ultra-fast body diode

Application

- UPS, Inverter, etc
- Solar
- High Power AC/DC Power Supply

Symbol

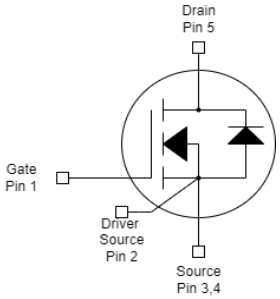
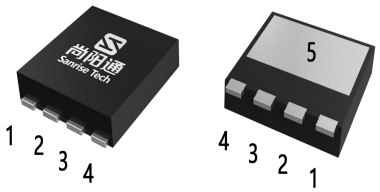


Figure 1 Symbol of SRC65R230BS

Package Type



PDFN8*8-4

Figure 2 Package Type of SRC65R230BS

Ordering Information

SRC65R230BS□□–□

Circuit Type

Package

D88: PDFN8*8-4

E: Lead Free

G: Green

TR: Tape & Reel

TY: Tray-3

Package	Part Number	Marking ID	Packing Type
PDFN8*8-4	SRC65R230BSD88TR-G	SRC65R230BSD88G	Tape & Reel

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Absolute Maximum Ratings[Note 1]

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Gate-Source Voltage (dynamic), AC (f>1 Hz)		V_{GSS}	±30	V
Power Dissipation（Tc=25℃，PDFN8*8-4）		P_{tot}	178	W
Continuous Drain Current	T_C=25ºC	I_D	21.2	A
	T_C=100ºC		13.4	
	T_C=125ºC		9.5	
Pulsed Drain Current (Note 2)		I_{DM}	64	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	200	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.7	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	2.5	A
Continuous Diode Forward Current		I_S	21.2	A
Diode Pulse Current		$I_{S.PULSE}$	64	A
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} =2.5A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C

Thermal characteristics

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	PDFN8*8-4	R_{thJC}			0.7	ºC /W
Thermal resistance, Junction-to-Ambient	PDFN8*8-4	R_{thJA}			62	ºC /W

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Electrical Characteristics

T_J = 25 ºC, 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	650			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=650V, V_{GS}=0V			10	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0V			100	nA
	Reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0V			-1.0	uA
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	2.3	3.3	4.3	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=10.0A		187	230	mΩ
Gate Resistance		R_G	f=1MHz, Open Drain		1.7		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		1660		pF
Output Capacitance		C_{OSS}			1820		
Reverse Transfer Capacitance		C_{RSS}			23		
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…480V		71		pF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			301		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=400V, I_D=10.0A R_G=3.4Ω, V_{GS}=10V		11		ns
Rise Time		t_r			10		
Turn-off Delay Time		$t_{d(off)}$			76		
Fall Time		t_f			8		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=480V, I_D=10.0A V_{GS}=0 to 10V		10.8		nC
Gate to Drain Charge		Q_{gd}			12.3		
Gate Charge Total		Q_g			38.4		
Gate Plateau Voltage		$V_{plateau}$			5.4		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=10.0A		0.87	1.1	V
Reverse Recovery Time		t_{rr}	V_R=400V, I_F=10.0A dI$_F$/dt=100.0A/us		125		ns
Reverse Recovery Charge		Q_{rr}			0.78		uC
Peak Reverse Recovery Current		I_{rrm}			11.4		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 480V

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 480 V

Typical Performance Characteristics

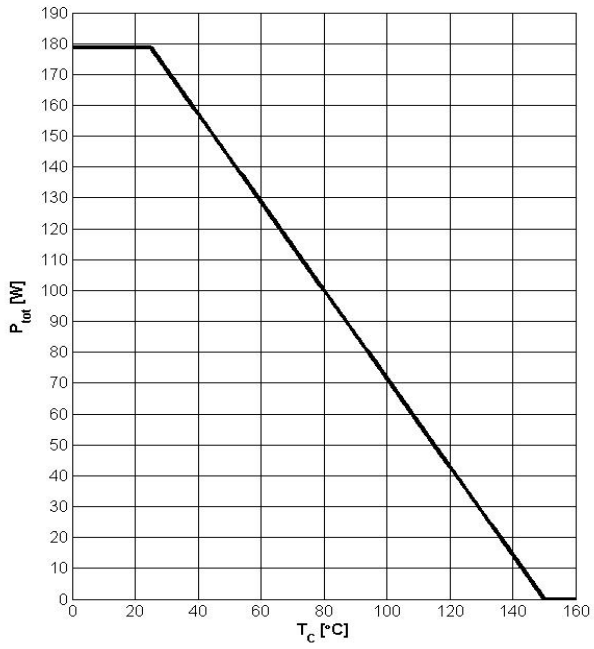
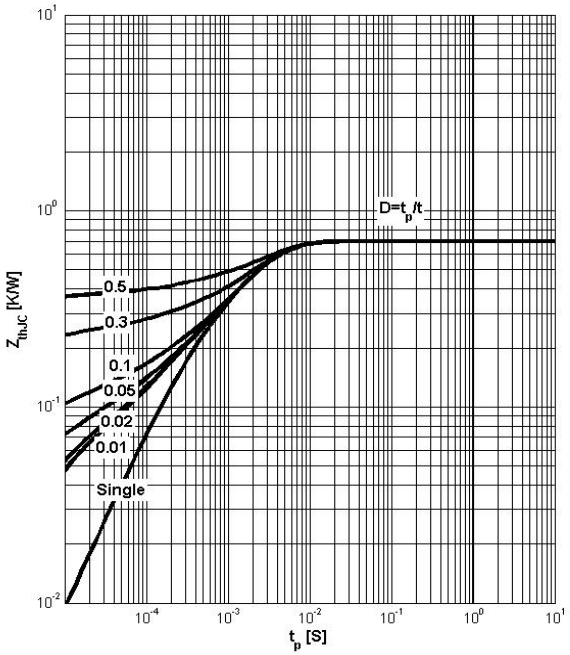
Figure 3: Power Dissipation	Figure 4: Max. Transient Thermal Impedance
	
$P_{tot} = f(T_c)$	$Z_{(thJC)} = f(t_p)$; parameter: $D = t_p/T$

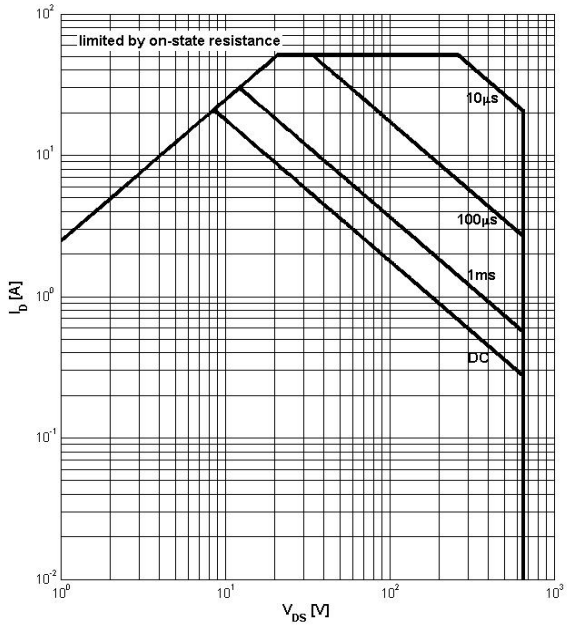
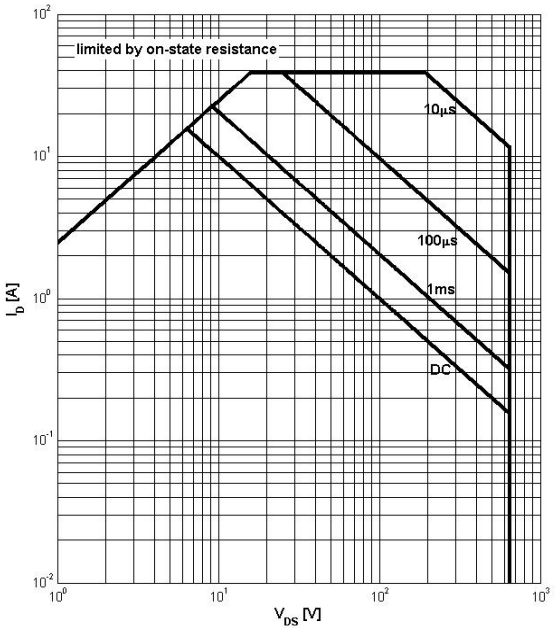
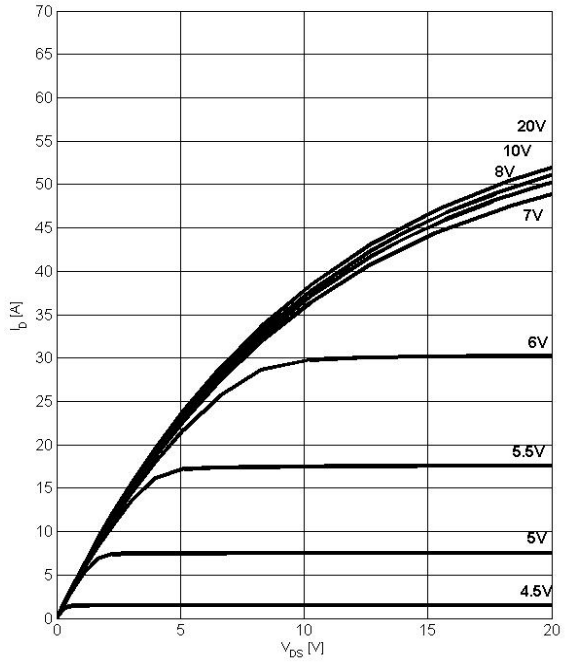
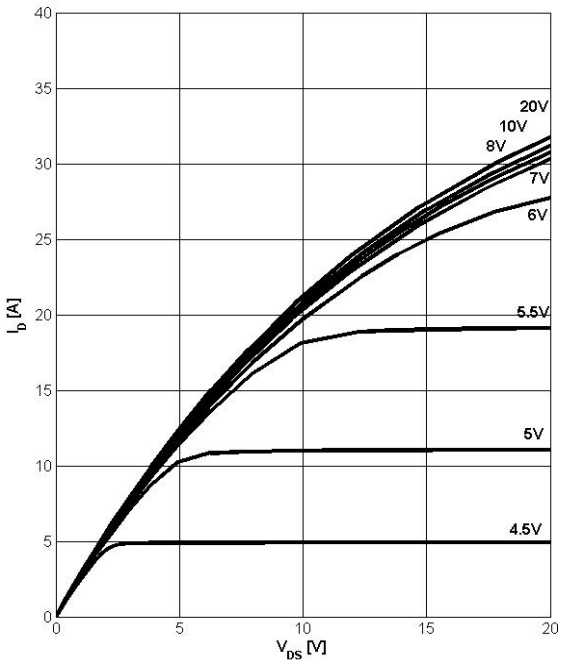
Figure 5: Safe Operating Area	Figure 6: Safe Operating Area
	
$I_D = f(V_{DS})$; T_c= 25ºC; V_{GS}>7V; parameter t_p	$I_D = f(V_{DS})$; T_c= 80ºC; V_{GS}>7V; parameter t_p

Figure 7: Typ. Output Characteristics



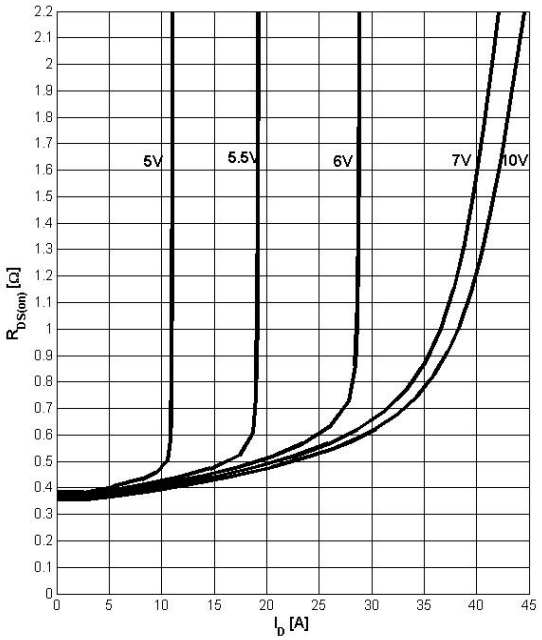
$I_D = f(V_{DS})$; Tj= 25ºC; parameter: V_{GS}

Figure 8: Typ. Output Characteristics



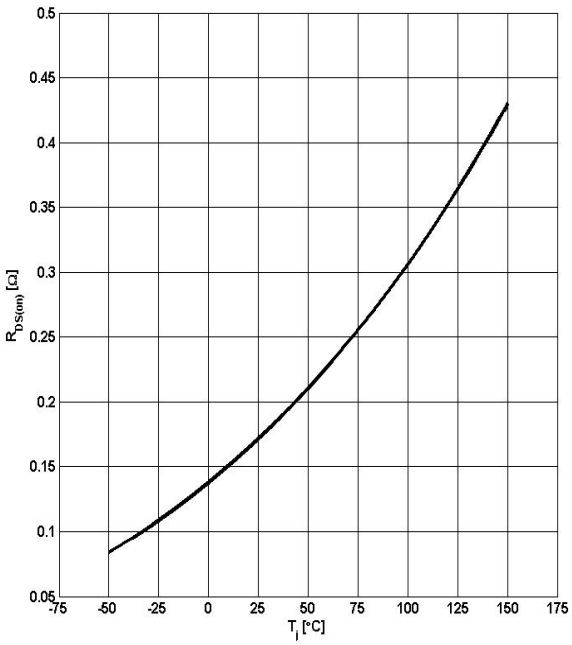
$I_D = f(V_{DS})$; T_j= 125ºC; parameter: V_{GS}

Figure 9: Typ. Drain-Source On-State Resistance



$R_{DS(ON)} = f(I_D)$; T_j=125ºC; parameter: V_{GS}

Figure 10: Typ. Drain-Source On-State Resistance



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

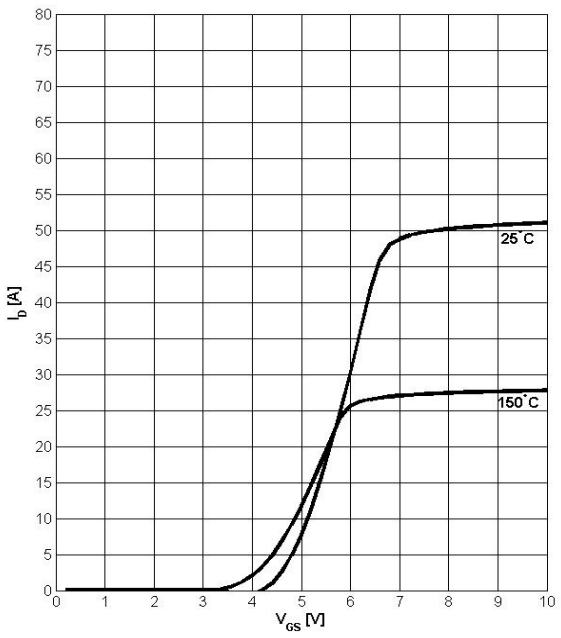
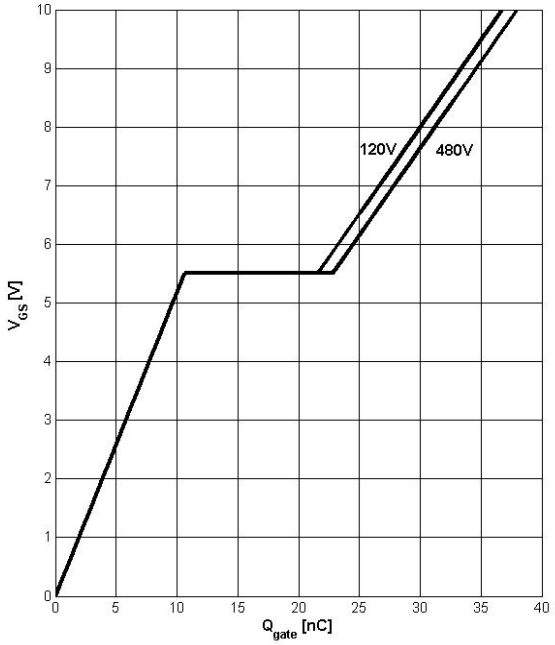
Figure 11: Typ. Transfer Characteristics	Figure 12: Typ. Gate Charge
	
$I_D = f(V_{GS})$; $V_{DS} = 20V$	$V_{GS} = f(Q_{gate})$, $I_D = 10A$ pulsed

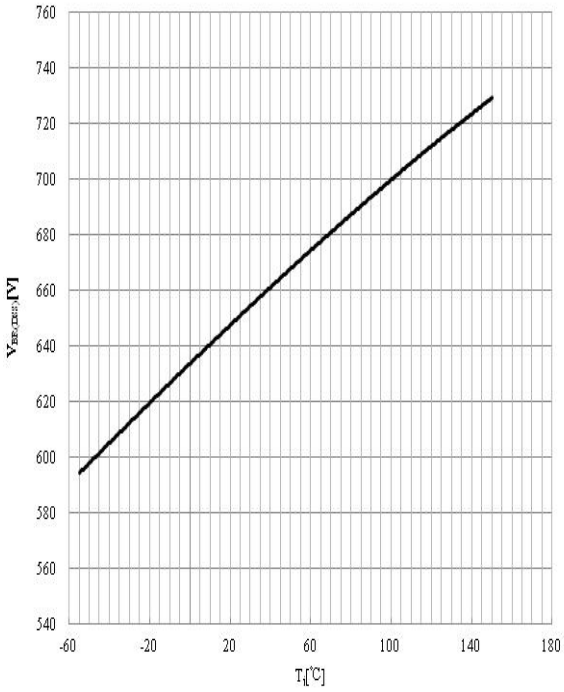
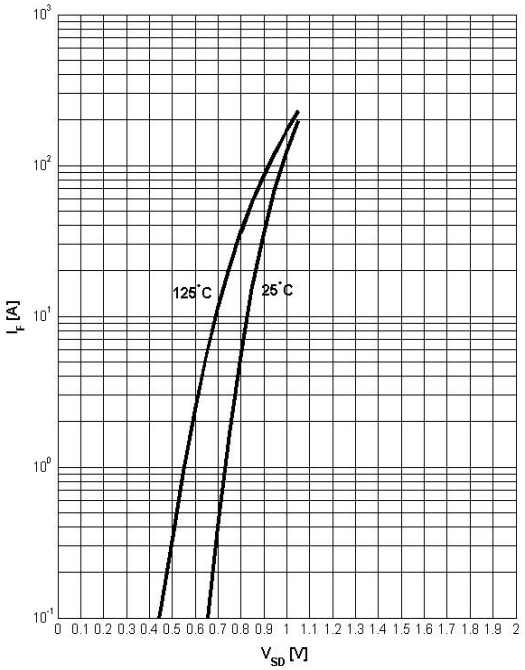
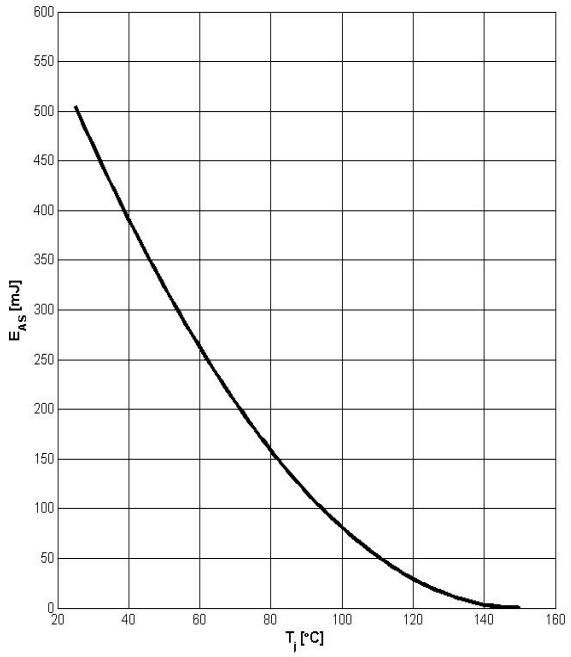
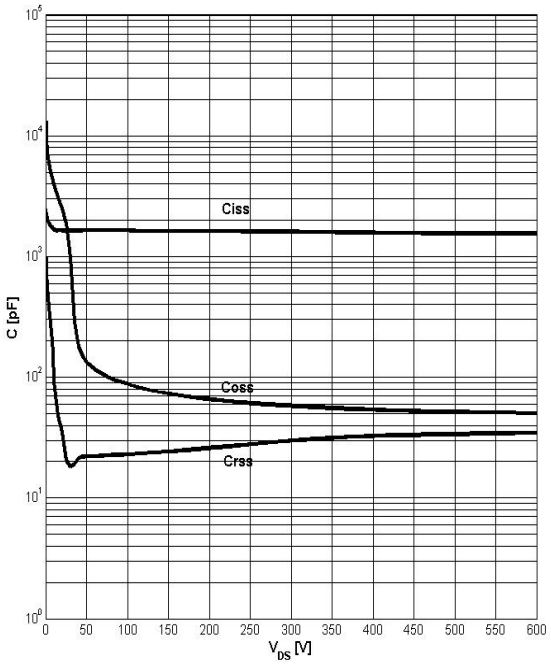
Figure 13: Drain-Source Breakdown Voltage	Figure 14: Forward Characteristics of Reverse Diode
	
$V_{BR(DSS)} = f(T_j)$; $I_D = 10mA$	$I_F = f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



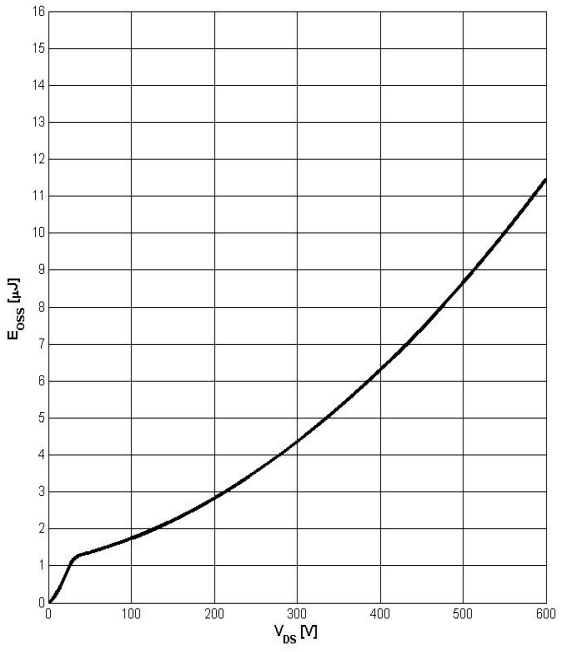
$E_{AS}=f(T_j)$; $I_D=3.6A$; $V_{DD}=60V$

Figure 16: Typ. Capacitances



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

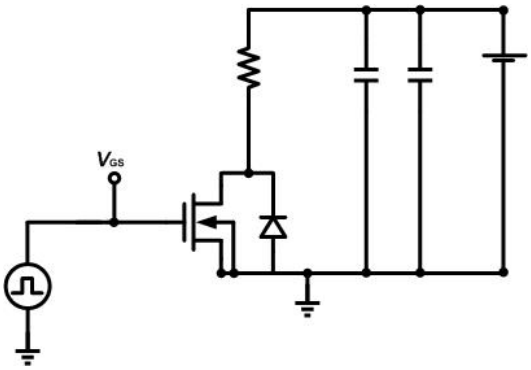
Figure 17: C_{OSS} Stored Energy

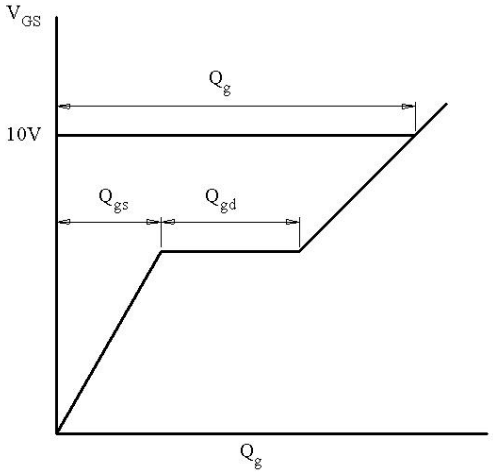


$E_{OSS}=f(V_{DS})$

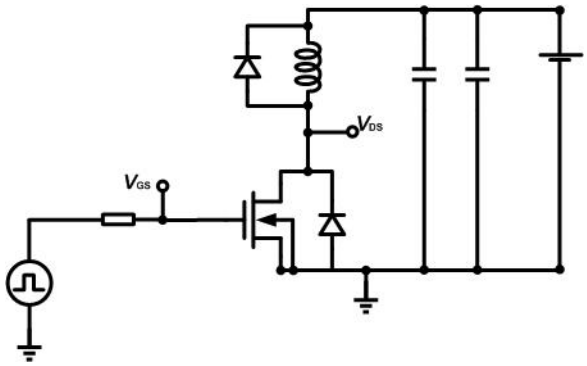
Test Circuits

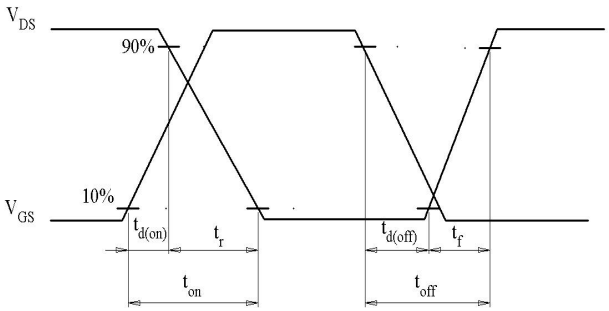
1. Gate Charge Test Circuit & Waveform



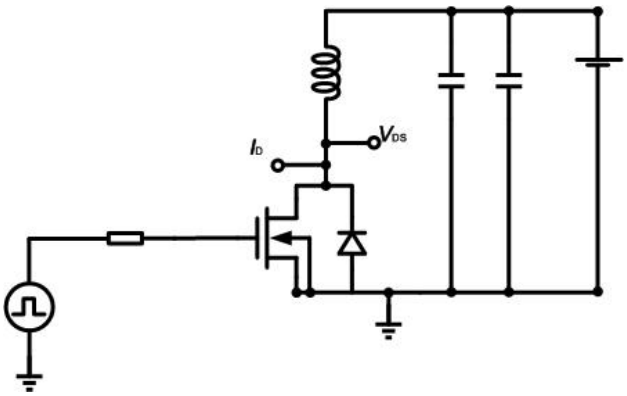


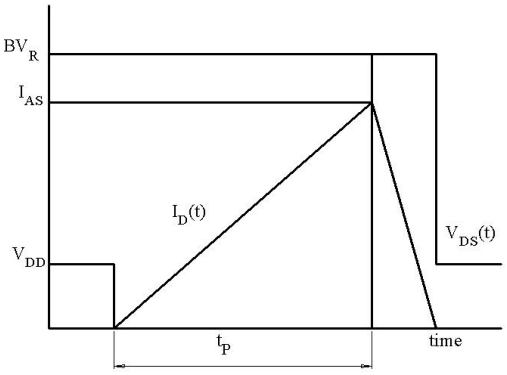
2. Switch Time Test Circuit



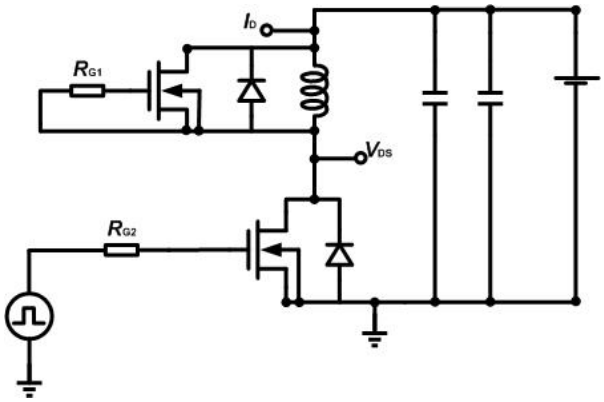


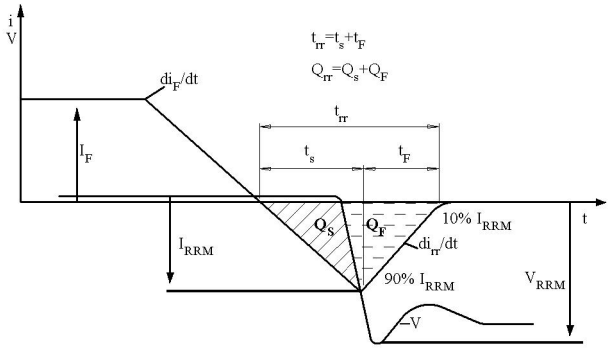
3. Unclaimed Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics





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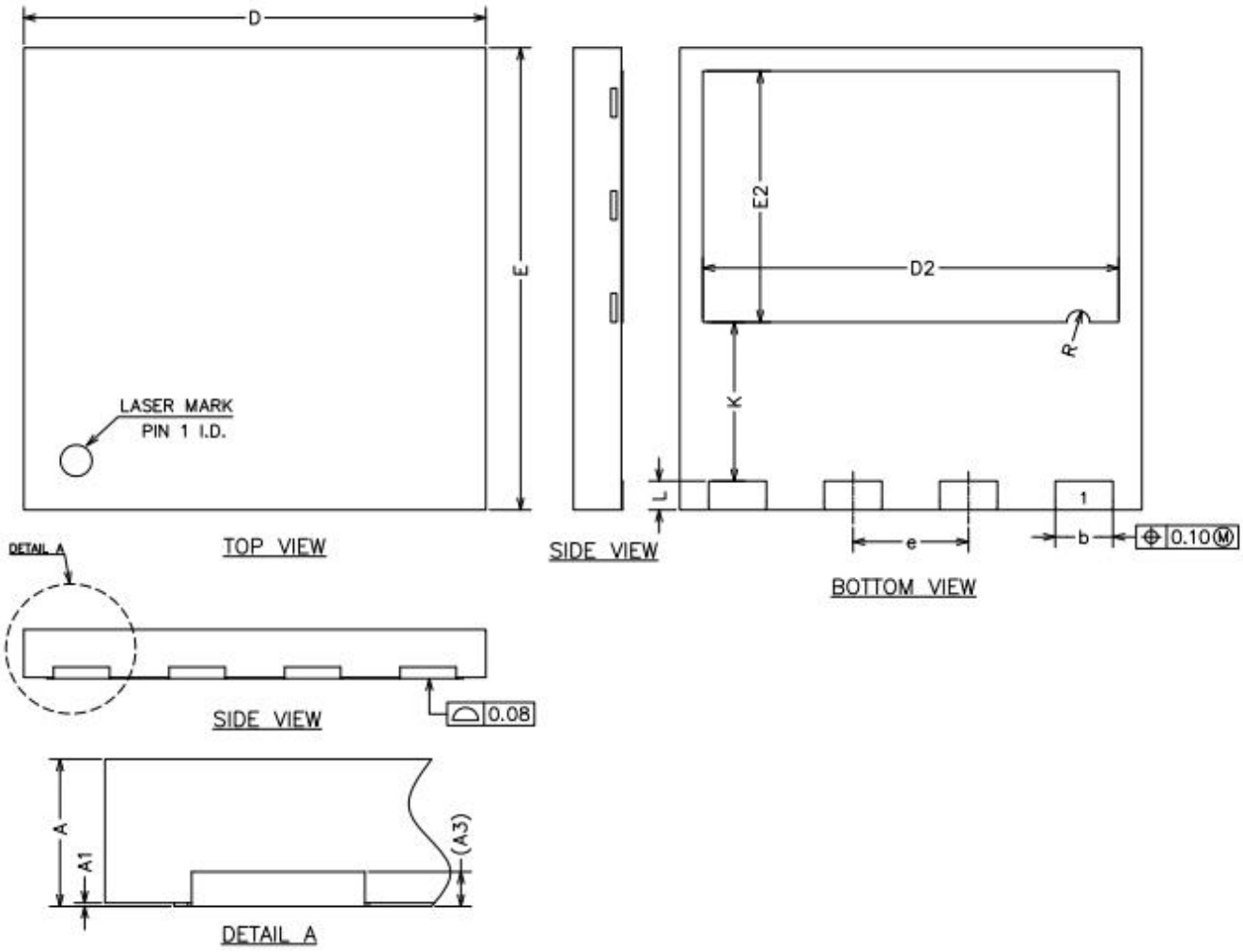
Mechanical Dimensions

PDFN8*8-4 **Unit: mm**



Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.80	0.85	0.90	D2	7.10	7.20	7.30
A1	0.00	0.02	0.05	E2	4.25	4.35	4.45
A3	-	0.20REF	-	e	1.90	2.00	2.10
b	0.90	1.00	1.10	K	2.65	2.75	2.85
D	7.90	8.00	8.10	L	0.40	0.50	0.60
E	7.90	8.00	8.10	R	-	0.20REF	-

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