



40V N&P-Channel Trench Power MOSFET

General Description

The SJM40NP570 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a wide variety of applications.

Features

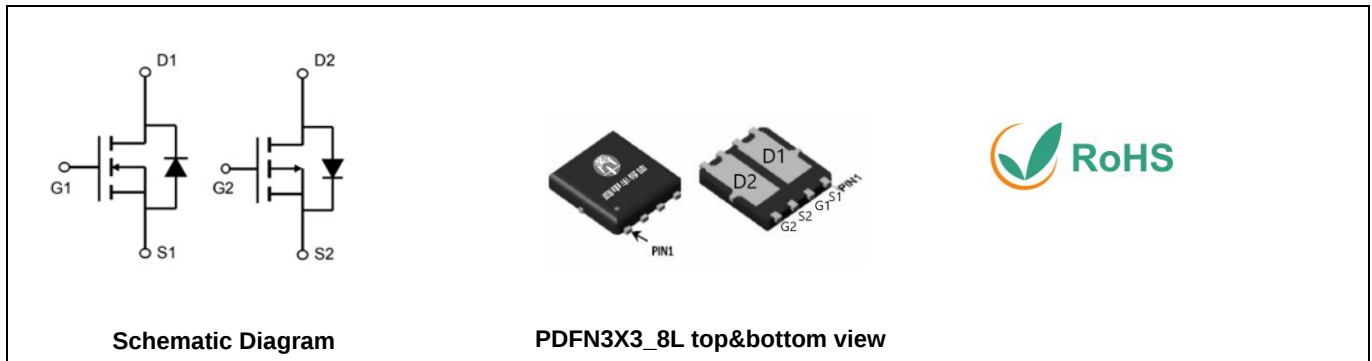
- Low Gate Charge
- 100% UIS Tested, 100% DVDS Tested
- High Power and current handing capability
- Lead free product is acquired

Application

- 48V E-bike controller
- Uninterruptible power supply
- Hard switched and high frequency circuits

Key Performance Parametes

Parameter	Value	Value	Unit
V_{DS}	40	-40	V
$R_{DS(ON_TYP)}$	15	36	mΩ
I_D	30	-11.9	A
Q_G	16	20	nC



Package Marking and Ordering Information

Device/Ordering Code	Marking	Package	Packing	Reel Size	Tape width	Quantity
SJM40NP570	40NP570	PDFN3X3_8L	Tape	\	\	5000 Pcs

Table 1. Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	N Limit	P Limit	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	40	-40	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	± 20	V
I_D	Drain Current-Continuous($T_c=25^\circ\text{C}$)	30	-11.9	A
	Drain Current-Continuous($T_c=100^\circ\text{C}$)	19	-7.5	A
I_{DM} (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 1)	120	-47.6	A
P_D	Maximum Power Dissipation($T_c=25^\circ\text{C}$)	35	11.5	W
	Maximum Power Dissipation($T_c=100^\circ\text{C}$)	14	4.6	W
E_{AS}	Avalanche energy (Note 2)	56	36	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150		$^\circ\text{C}$

Table 2. Thermal Characteristic

Symbol	Parameter	N Limit	P Limit	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.59	10.9	$^\circ\text{C/W}$



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Table 3. N-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V T _J =25℃			1	μA
		V _{DS} =40V, V _{GS} =0V T _J =125℃			100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1		2	V
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =15A		20		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =20A T _J =25℃		15	19.5	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =15A T _J =25℃		16.8	22.34	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1.0MHz		989		pF
C _{oss}	Output Capacitance			87		pF
C _{rss}	Reverse Transfer Capacitance			67		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		2.62		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =20V, R _L =1Ω, R _{GEN} =3Ω		9		nS
t _r	Turn-on Rise Time			10		nS
t _{d(off)}	Turn-Off Delay Time			30		nS
t _f	Turn-Off Fall Time			6		nS
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =20V, I _D =20A		16		nC
Q _{gs}	Gate-Source Charge			2		nC
Q _{gd}	Gate-Drain Charge			3		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current (Body Diode)				30	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =20A			1	V
t _{rr}	Reverse Recovery Time	I _F =20A, dI/dt=100A/μs		18		ns
Q _{rr}	Reverse Recovery Charge	I _F =20A, dI/dt=100A/μs		8		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

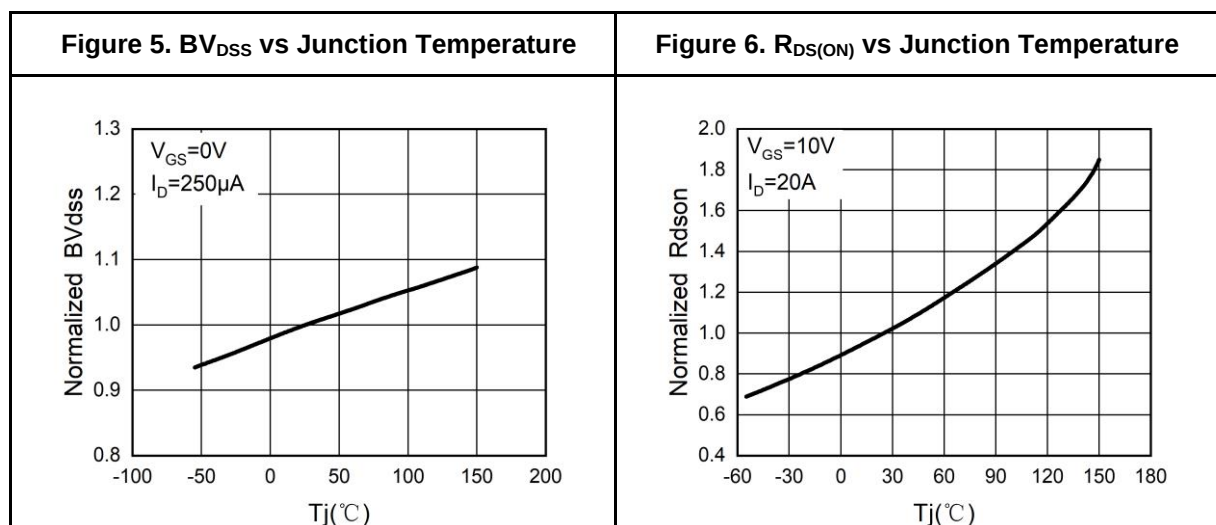
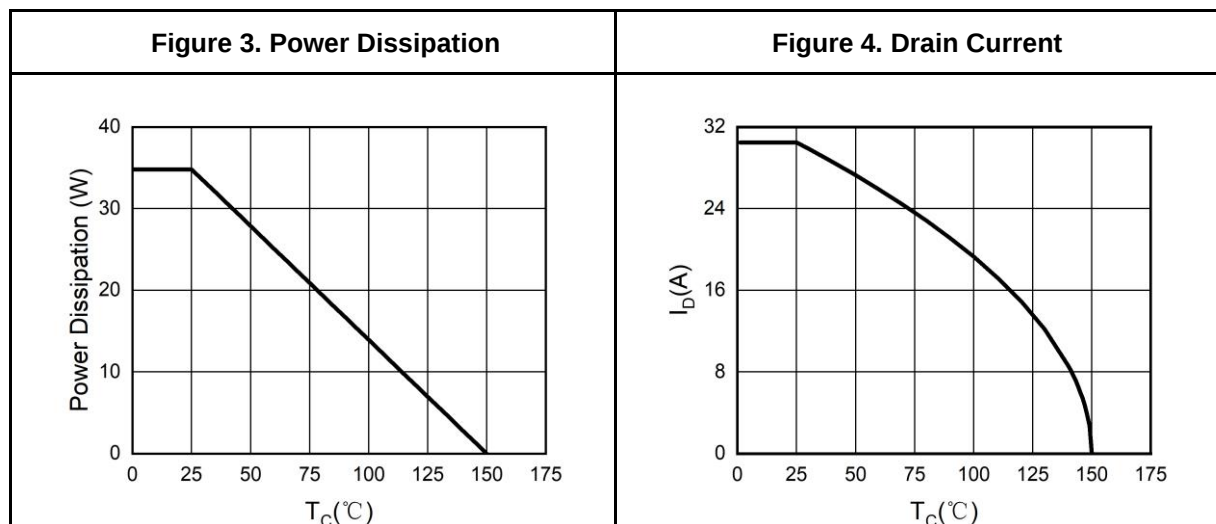
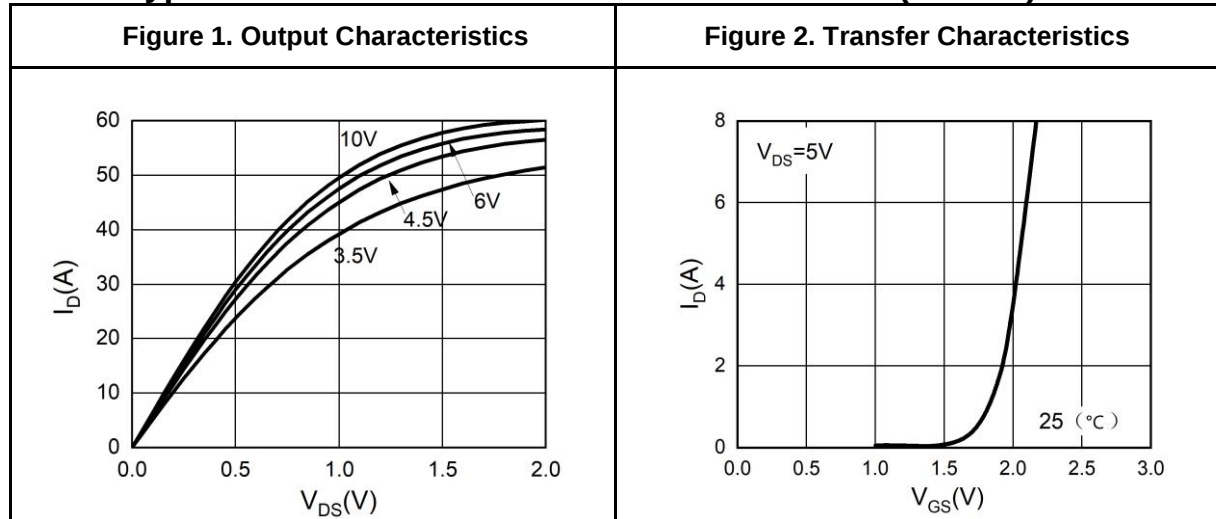
Notes 2. E_{AS} condition: $T_J=25^{\circ}\text{C}, V_{DD}=40V, V_G=10V, R_g=25\Omega, L=0.5\text{mH}$.

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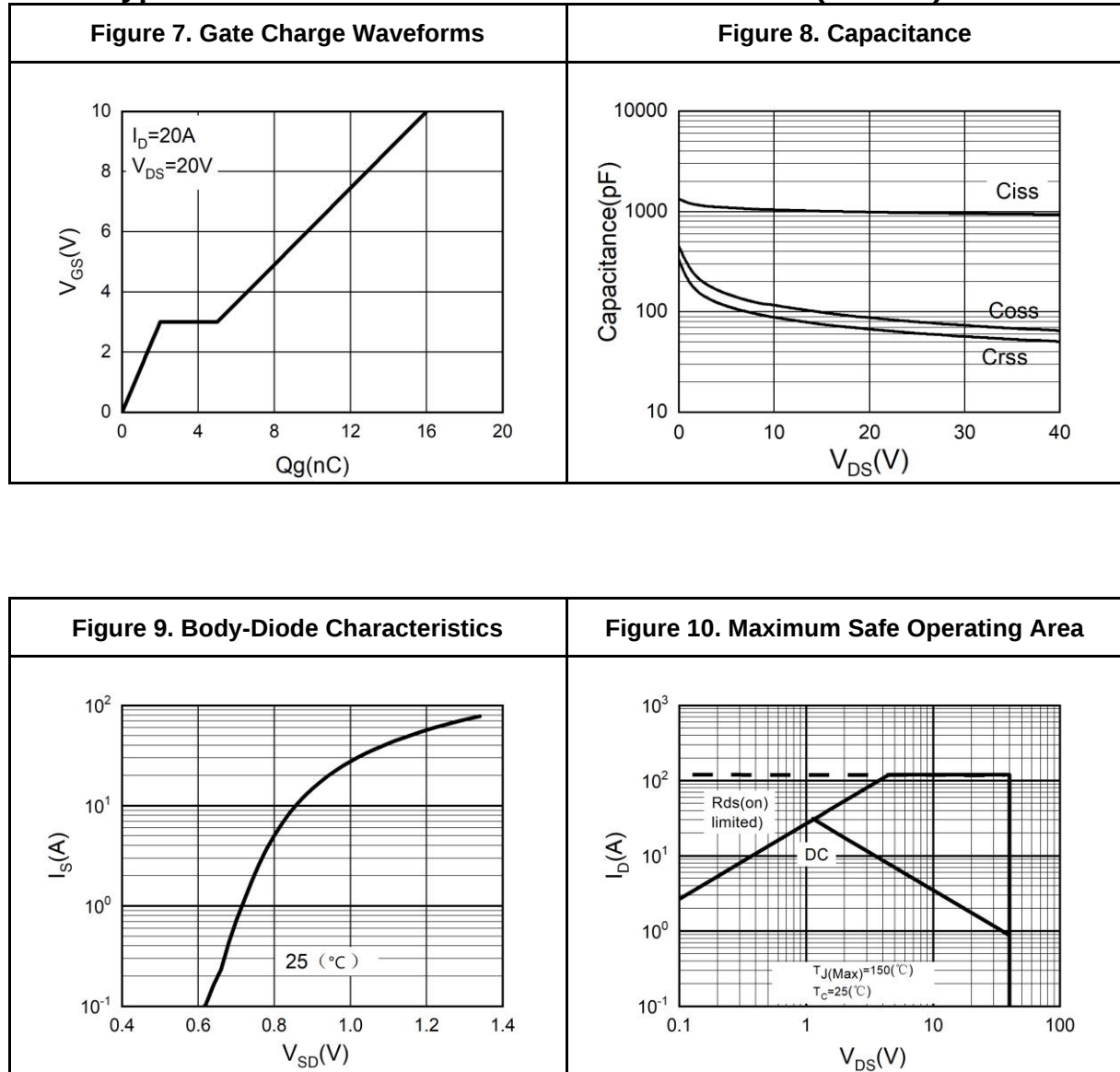
N-Channel Typical Electrical And Thermal Characteristics (Curves)





40V N&P-Channel Trench Power MOSFET

N-Channel Typical Electrical And Thermal Characteristics (Curves)





40V N&P-Channel Trench Power MOSFET

Table 4. P-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-40V, V _{GS} =0V T _J =25℃			-1	μA
		V _{DS} =-40V, V _{GS} =0V T _J =125℃			-100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1		-2.5	V
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-5A		11		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-5A T _J =25℃		36	46.8	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-4A T _J =25℃		45.3	60.3	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-20V,V _{GS} =0V, f=1.0MHz		684		pF
C _{oss}	Output Capacitance			68.9		pF
C _{rss}	Reverse Transfer Capacitance			48.3		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		11.96		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =-10V, V _{DS} =-20V, R _L =4Ω, R _{GEN} =3Ω		6		nS
t _r	Turn-on Rise Time			10		nS
t _{d(off)}	Turn-Off Delay Time			40		nS
t _f	Turn-Off Fall Time			15		nS
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-20V, I _D =-5A		20		nC
Q _{gs}	Gate-Source Charge			3.5		nC
Q _{gd}	Gate-Drain Charge			4		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current (Body Diode)				-11.9	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =-5A			-1	V
t _{rr}	Reverse Recovery Time	I _F =-5A, dI/dt=100A/μs		22		ns
Q _{rr}	Reverse Recovery Charge	I _F =-5A, dI/dt=100A/μs		12		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

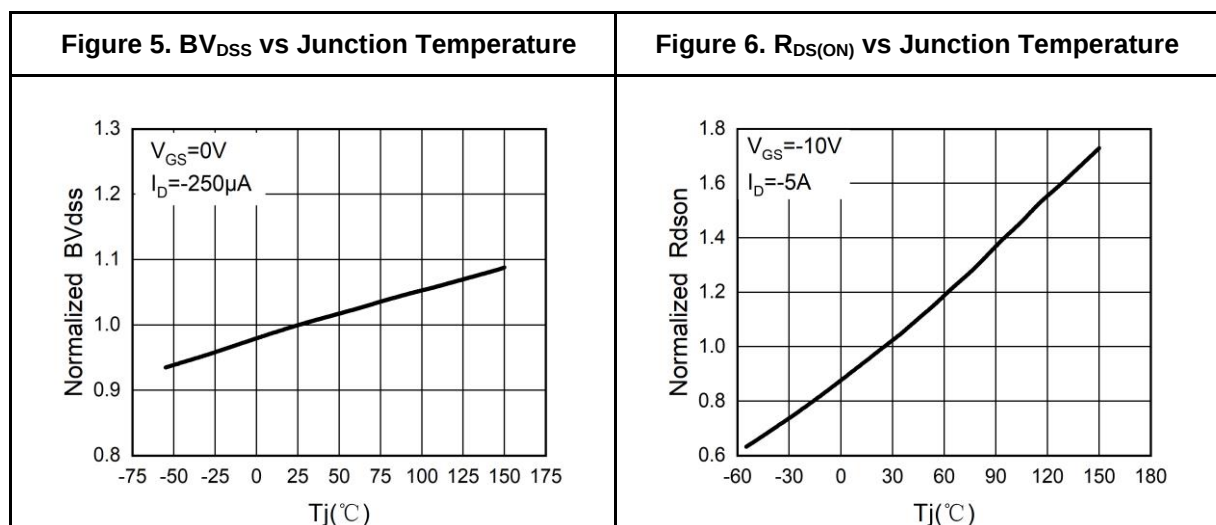
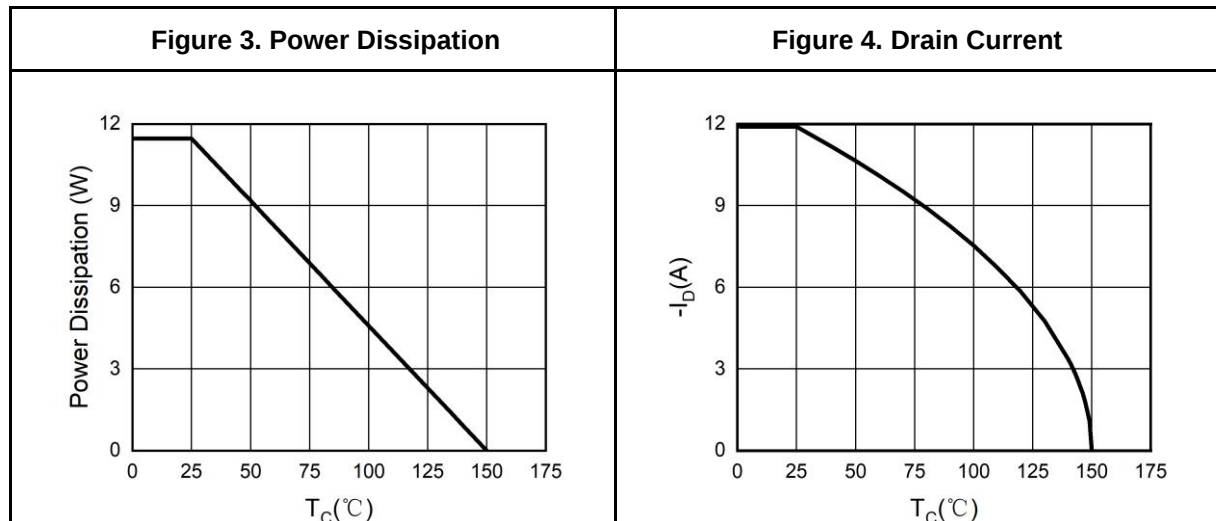
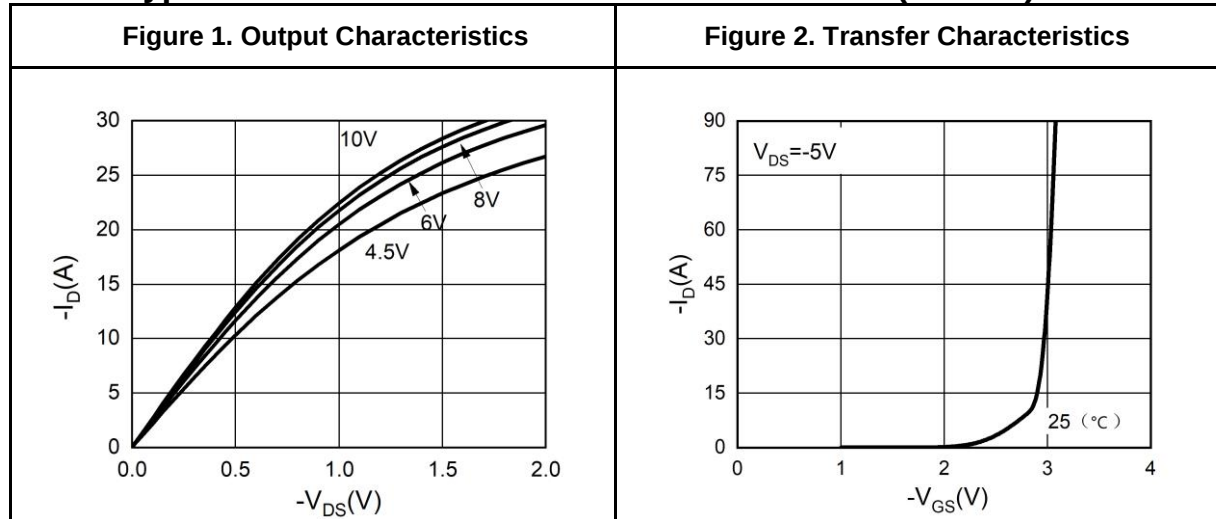
Notes 2.EAS condition: T_J=25℃, V_{DD}=40V, V_G=10V, R_g=25Ω, L=0.5mH.

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.



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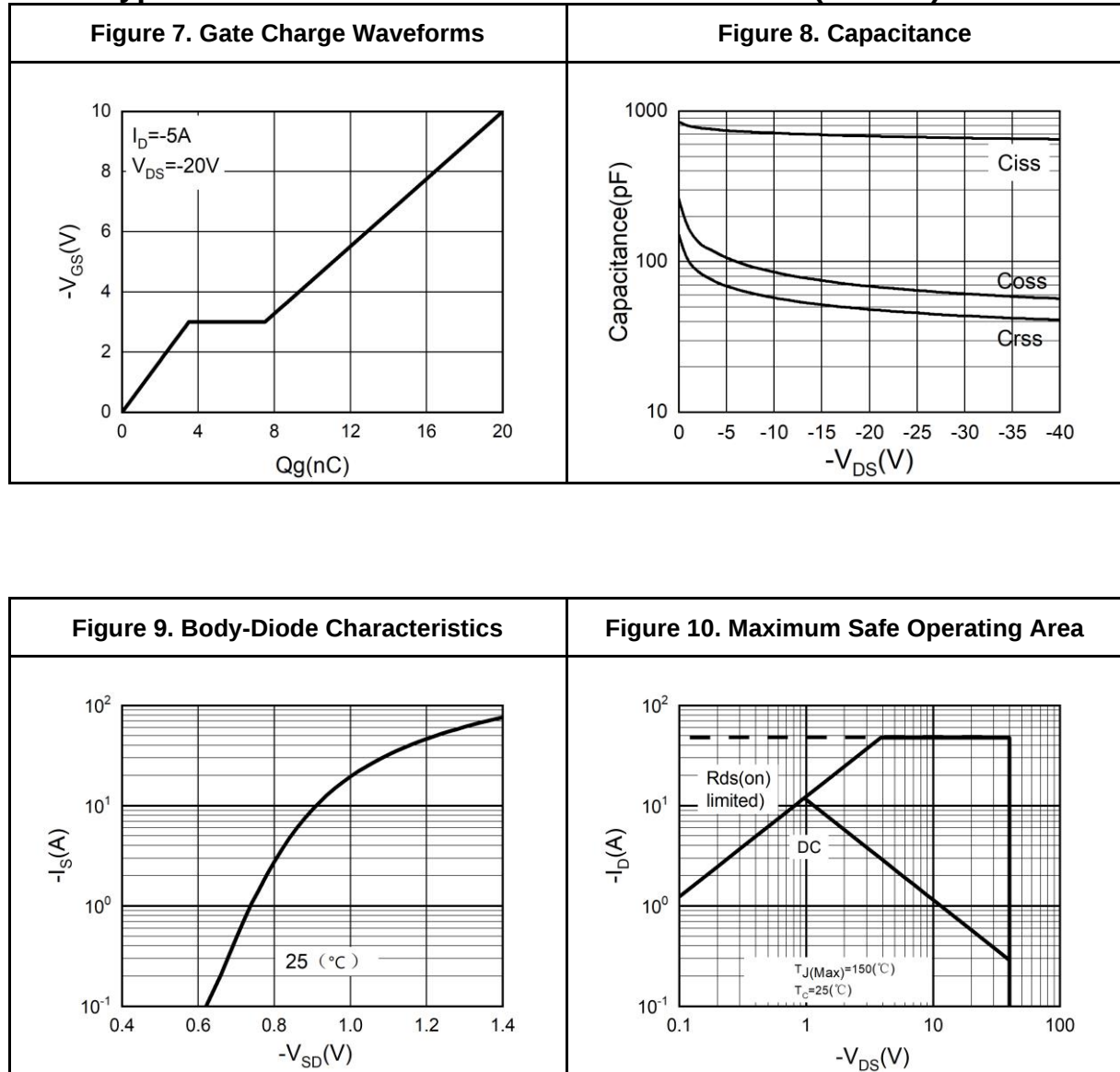
P-Channel Typical Electrical And Thermal Characteristics (Curves)





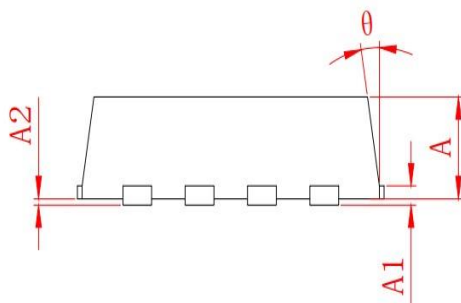
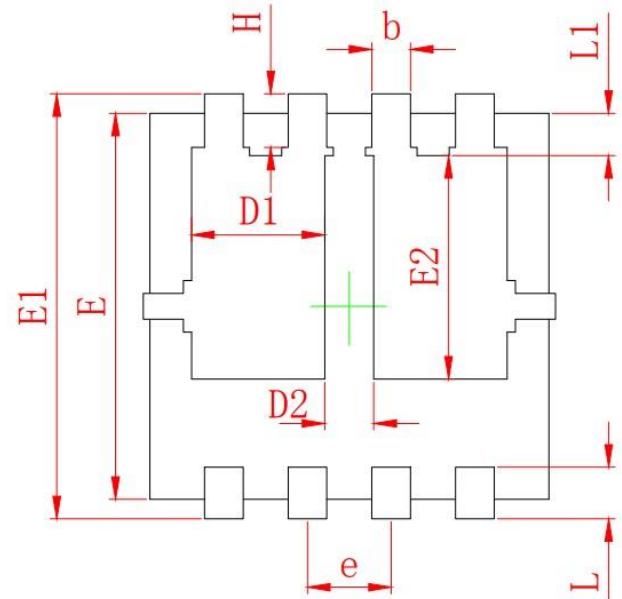
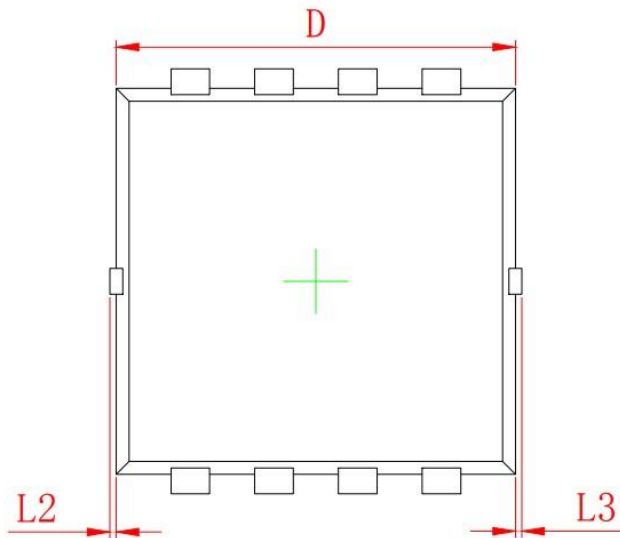
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P-Channel Typical Electrical And Thermal Characteristics (Curves)





PDFN3X3-8L Package Information



SYMBOL	MILLIMETER	
	MIN	MAX
A	0.700	0.900
A1	0.152 REF.	
A2	0~0.05	
D	3.000	3.200
D1	0.935	1.135
D2	0.280	0.480
E	2.900	3.100
E1	3.150	3.450
E2	1.535	1.935
b	0.200	0.400
e	0.550	0.750
L	0.300	0.500
L1	0.180	0.480
L2	0~0.100	
L3	0~0.100	
H	0.315	0.515
θ	8°	12°



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