



20V NP-Channel Trench Power MOSFET

General Description

The SJM20NP270 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a wide variety of applications.

Features

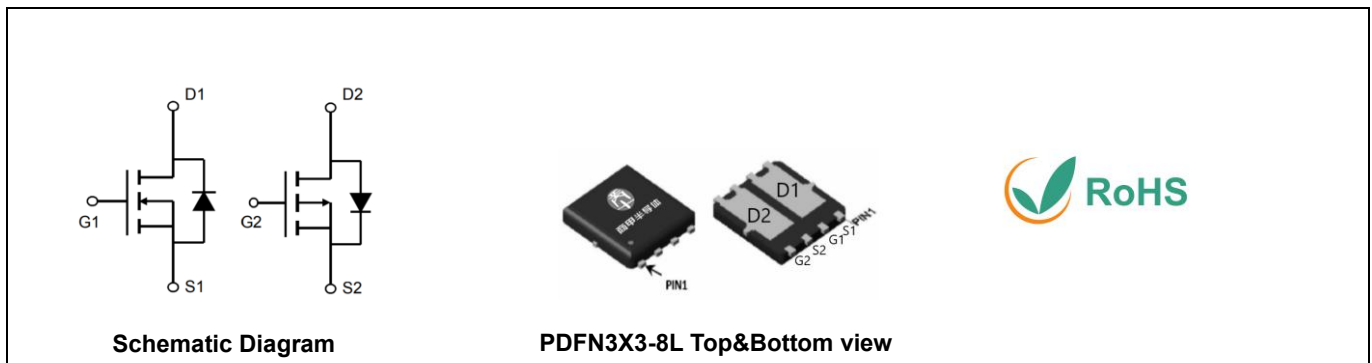
- Low Gate Charge
- High Power and current handing capability
- Lead free product is acquired

Application

- PWM Applications
- Load Switch
- Power Management

Key Performance Parametes

Parameter	Value	Value	Unit
V_{DS}	20	-20	V
$R_{DS(ON_TYP)}$	7.5	15.7	m Ω
I_D	24	-16	A
Q_G	15	14	nC



Package Marking and Ordering Information

Device/Ordering Code	Marking	Package	Packing	Reel Size	Tape width	Quantity
SJM20NP270	SJM20NP270	PDFN3X3-8L	Tape	\	\	5000 Pcs

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

Symbol	Parameter	N Limit	P Limit	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	20	-20	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 12	± 12	V
I_D	Drain Current-Continuous($T_C=25^\circ\text{C}$)	24	-16	A
	Drain Current-Continuous($T_C=100^\circ\text{C}$)	15	-10	A
I_{DM} (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 1)	96	-64	A
P_D	Maximum Power Dissipation($T_C=25^\circ\text{C}$)	7.6	7.6	W
	Maximum Power Dissipation($T_C=100^\circ\text{C}$)	3	3	W
E_{AS}	Avalanche energy (Note 2)	56	49	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	16.5	16.5	$^\circ\text{C}/\text{W}$



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Table 3. N-Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
B _V DSS	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V T _J =25°C			1	μA
		V _{DS} =20V, V _{GS} =0V T _J =125°C			100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±12V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.4		1	V
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =15A		56		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =20A T _J =25°C		7.5	9.4	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =2.5V, I _D =15A T _J =25°C		9.8	13	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz		1490		pF
C _{oss}	Output Capacitance			146		pF
C _{rss}	Reverse Transfer Capacitance			130		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		1.2		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =4.5V, V _{DS} =10V, R _L =0.67Ω, R _{GEN} =3Ω		12		nS
t _r	Turn-on Rise Time			10		nS
t _{d(off)}	Turn-Off Delay Time			45		nS
t _f	Turn-Off Fall Time			8		nS
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =15A		15		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)				24	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =15A			1.2	V
t _{rr}	Reverse Recovery Time	I _F =15A, dI/dt=100A/μs		12		ns
Q _{rr}	Reverse Recovery Charge	I _F =15A, dI/dt=100A/μs		5		nC

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

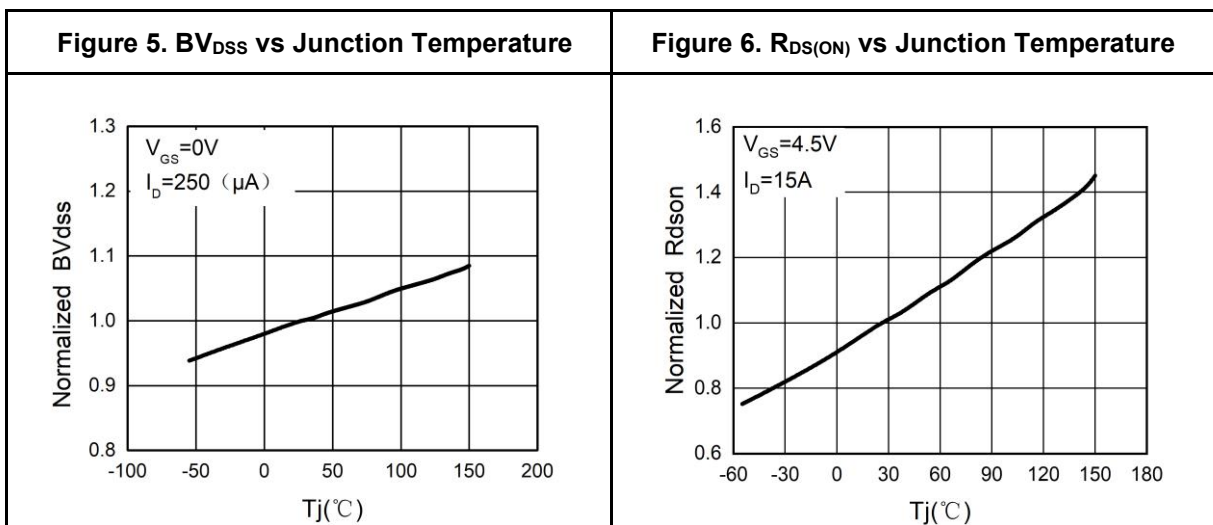
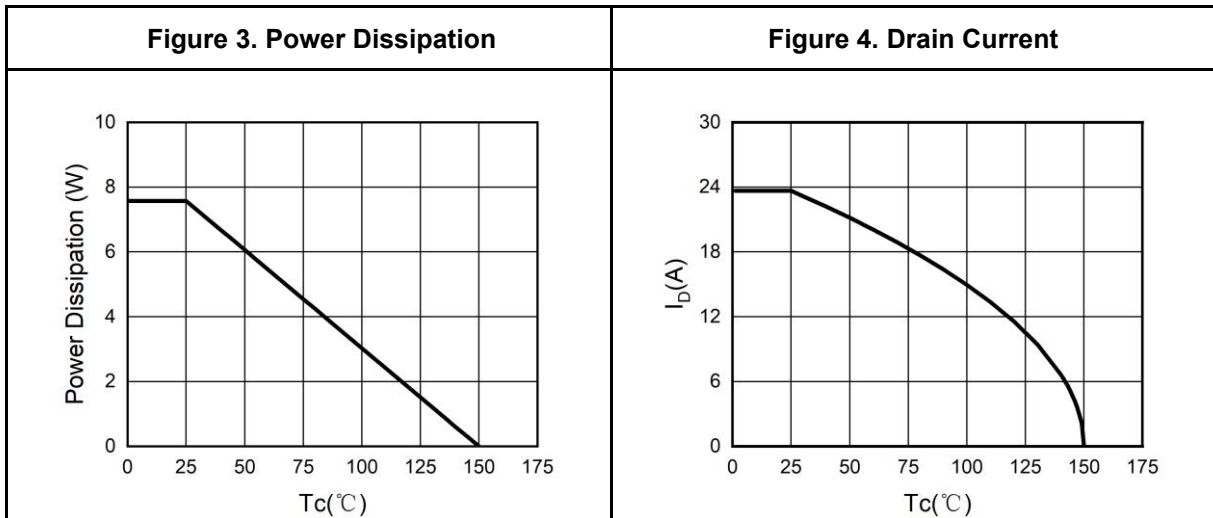
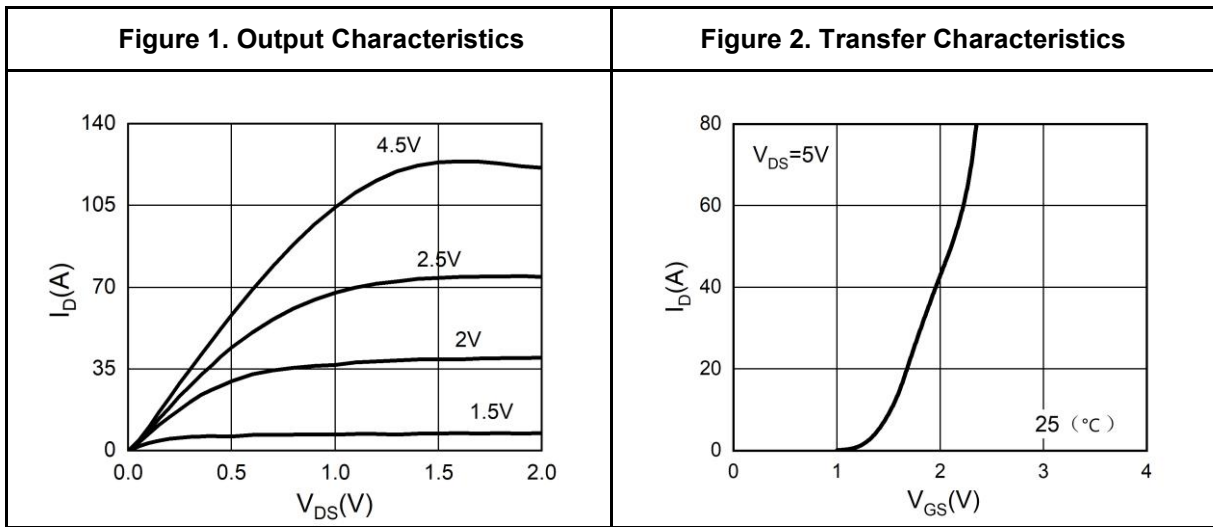
Notes 2.EAS condition: T_J=25°C, V_{DD}=20V, V_G=10V, R_g=25Ω, L=0.5mH.

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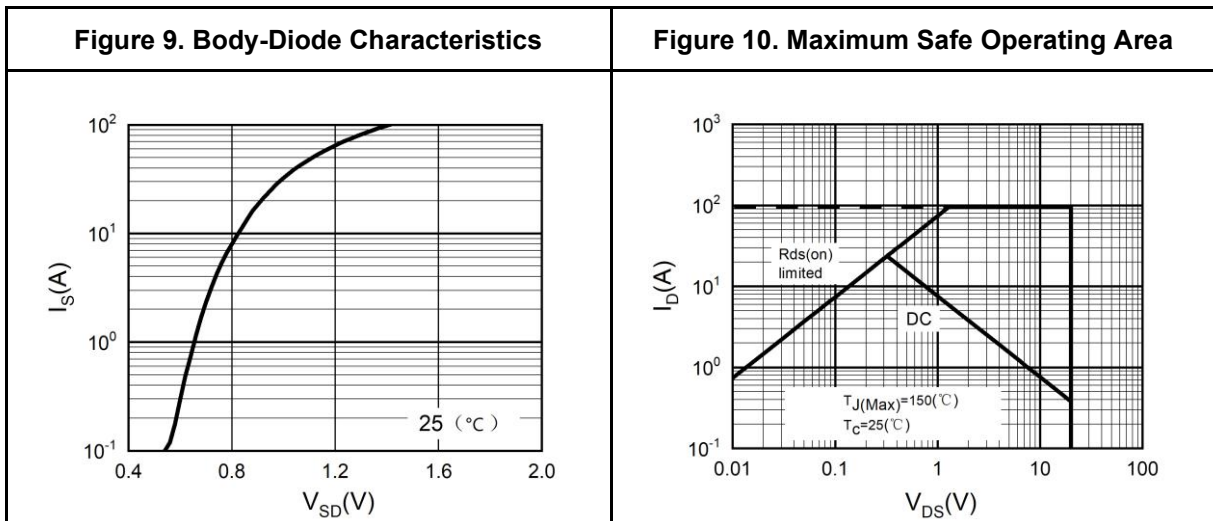
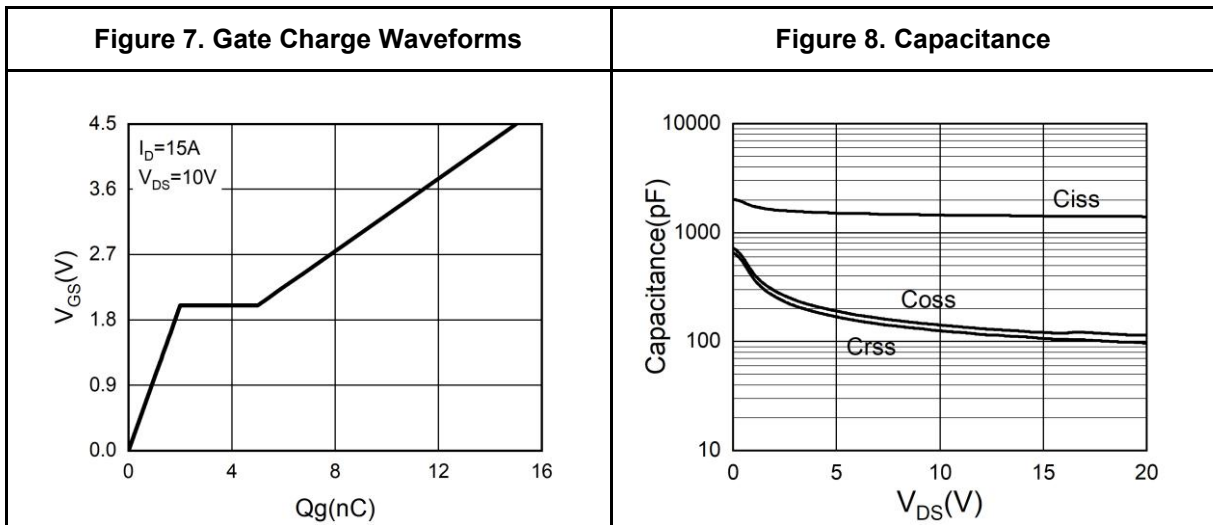
N-Channel Typical Electrical And Thermal Characteristics (Curves)





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Table 4. P-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	$V_{GS}=0V, I_D=-250\mu A$	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$			-1	μA
		$V_{DS}=-20V, V_{GS}=0V, T_J=125^\circ\text{C}$			-100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5		-1	V
g_{FS}	Forward Transconductance	$V_{DS}=-5V, I_D=-3A$		13.4		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=-4.5V, I_D=-3A, T_J=25^\circ\text{C}$		15.7	19.6	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=-2.5V, I_D=-2A, T_J=25^\circ\text{C}$		20.1	26.7	m Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1.0\text{MHz}$		1570		pF
C_{oss}	Output Capacitance			165		pF
C_{rss}	Reverse Transfer Capacitance			146		pF
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0\text{MHz}$		5.5		Ω
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	$V_{GS}=-4.5V, V_{DS}=-10V, R_L=3.3\Omega, R_{GEN}=3\Omega$		13		nS
t_r	Turn-on Rise Time			32		nS
$t_{d(off)}$	Turn-Off Delay Time			27		nS
t_f	Turn-Off Fall Time			9		nS
Q_g	Total Gate Charge	$V_{GS}=-4.5V, V_{DS}=-1V, I_D=-3A$		14		nC
Q_{gs}	Gate-Source Charge			1.2		nC
Q_{gd}	Gate-Drain Charge			4.8		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				-16	A
V_{SD}	Forward on Voltage (Note 3)	$V_{GS}=0V, I_S=-3A$			-1.2	V
t_{rr}	Reverse Recovery Time	$I_F=-3A, dI/dt=100A/\mu s$		160		ns
Q_{rr}	Reverse Recovery Charge	$I_F=-3A, dI/dt=100A/\mu s$		60		nC

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

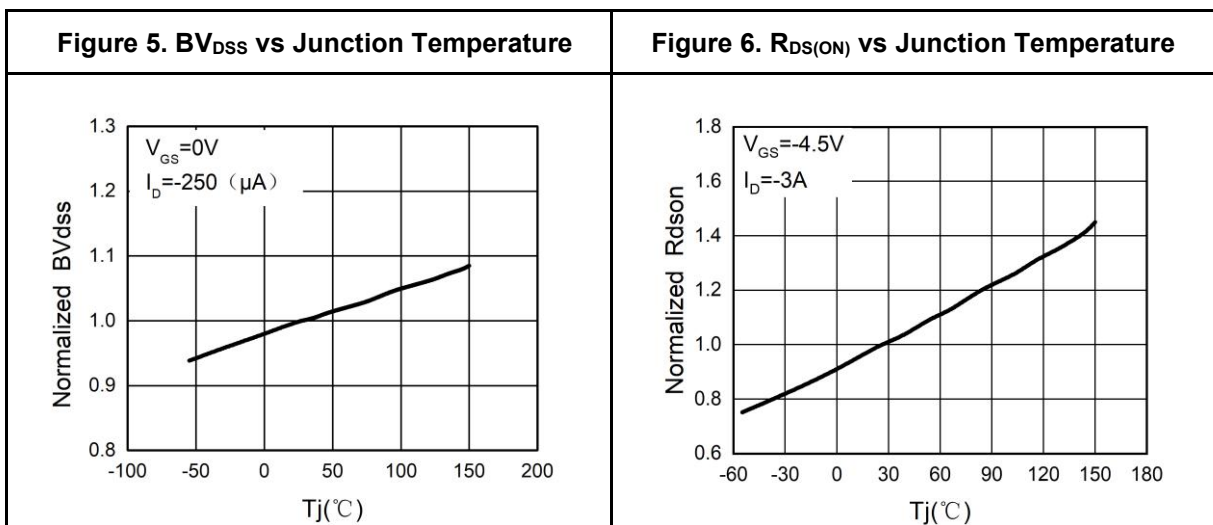
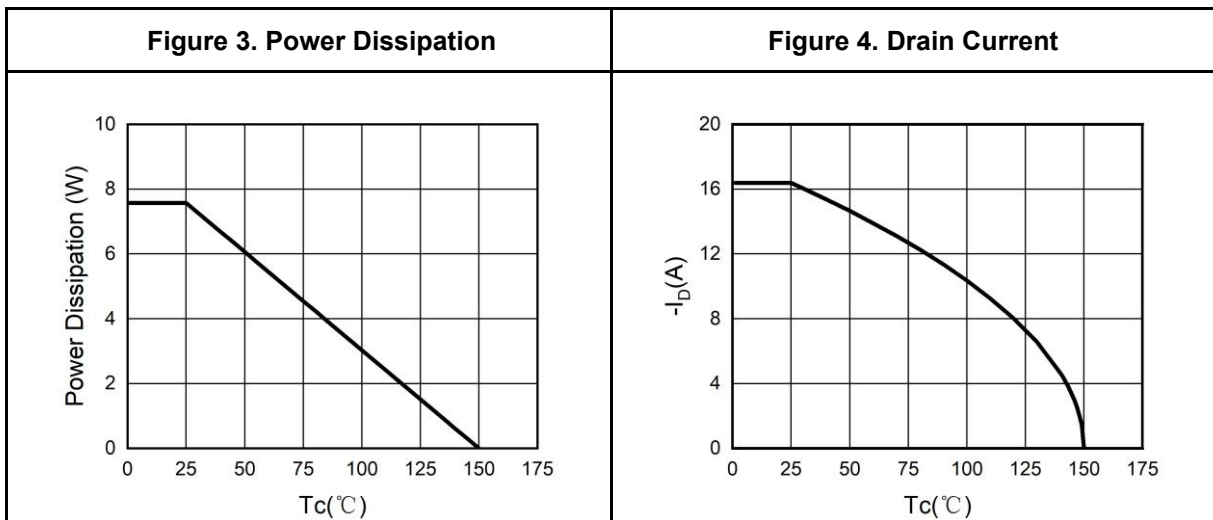
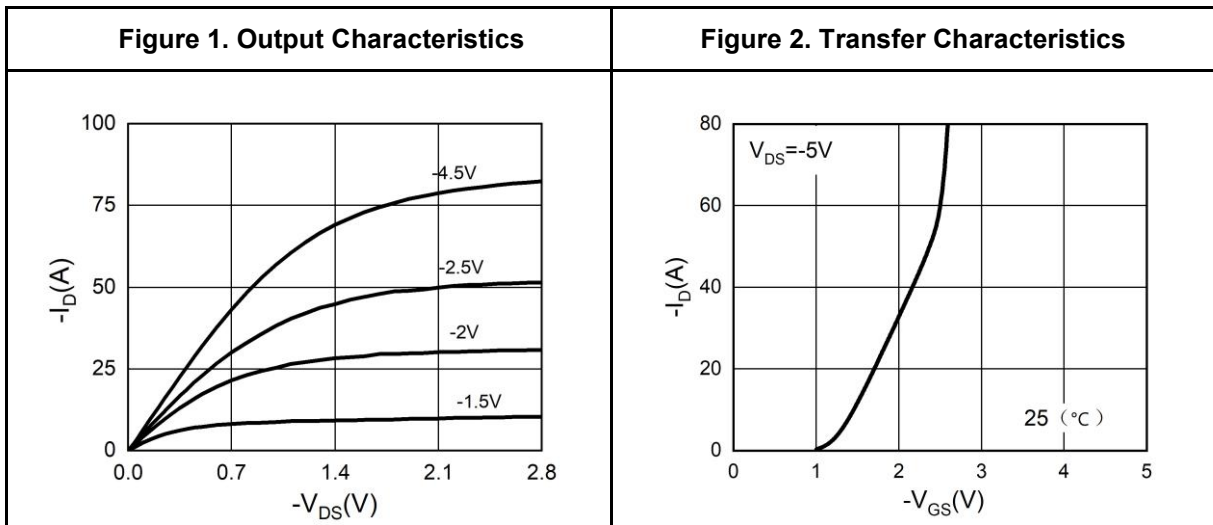
Notes 2.EAS condition: $T_J=25^\circ\text{C}, V_{DD}=-20V, V_G=-10V, R_g=25\Omega, L=0.5\text{mH}$.

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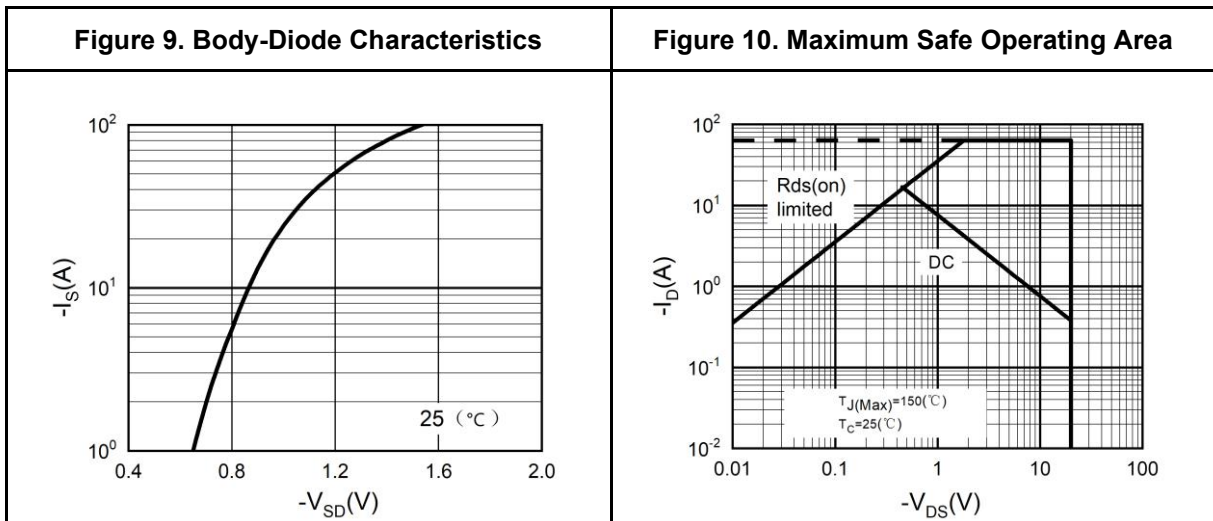
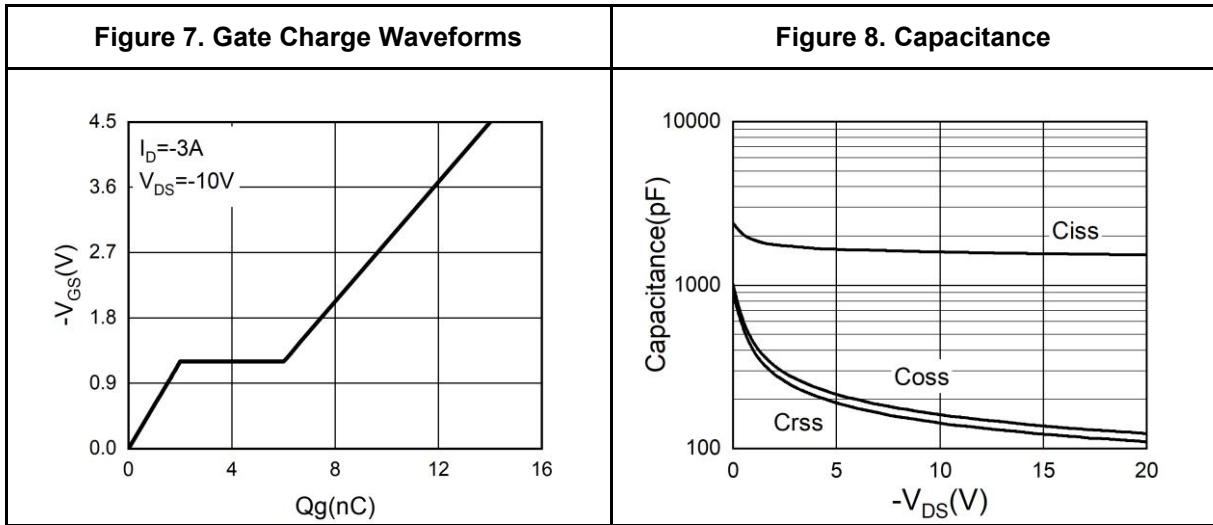
P-Channel Typical Electrical And Thermal Characteristics (Curves)





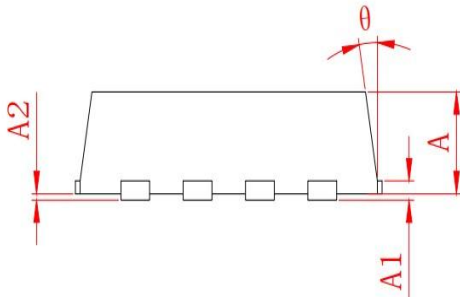
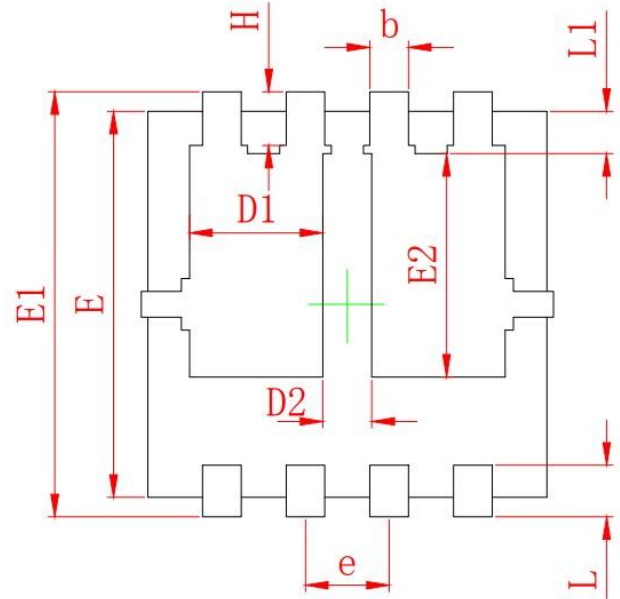
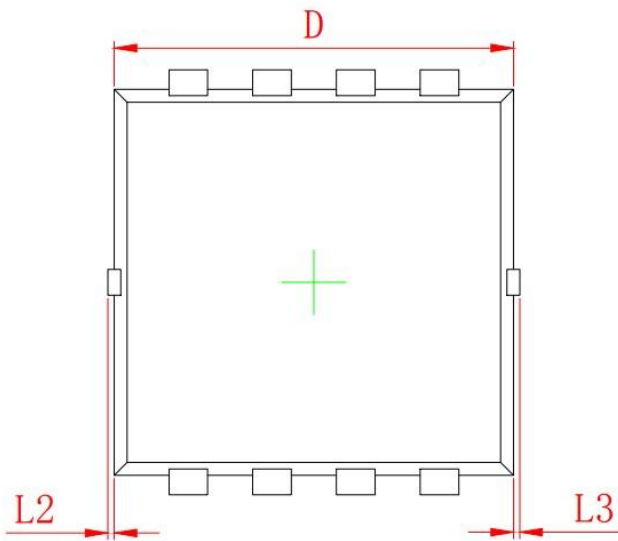
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P-Channel Typical Electrical And Thermal Characteristics (Curves)





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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Attention

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