

Complementary Trench MOSFET

2NP03

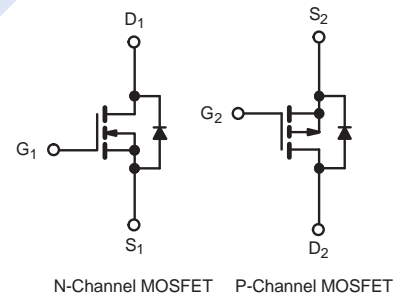
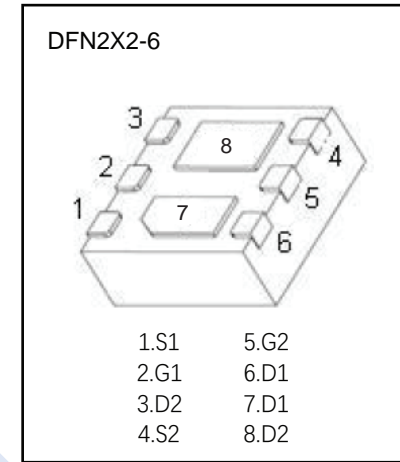
■ Features

N-Channel

- $V_{DS} (V) = 12V$
- $I_D = 4.5 A (V_{GS} = 4.5V)$
- $R_{DS(ON)} < 29m\Omega (V_{GS} = 4.5V)$
- $R_{DS(ON)} < 34m\Omega (V_{GS} = 2.5V)$
- $R_{DS(ON)} < 44m\Omega (V_{GS} = 1.8V)$
- $R_{DS(ON)} < 65m\Omega (V_{GS} = 1.5V)$

P-Channel

- $V_{DS} (V) = -12V$
- $I_D = -4.5 A (V_{GS} = -4.5V)$
- $R_{DS(ON)} < 61m\Omega (V_{GS} = -4.5V)$
- $R_{DS(ON)} < 81m\Omega (V_{GS} = -2.5V)$
- $R_{DS(ON)} < 115m\Omega (V_{GS} = -1.8V)$
- $R_{DS(ON)} < 170m\Omega (V_{GS} = -1.5V)$



■ Absolute Maximum Ratings $T_a = 25^\circ C$

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	12	-12	V
Gate-Source Voltage		V_{GS}	± 8		
Continuous Drain Current	$T_C=25^\circ C$	I_D	4.5	-4.5	A
	$T_C=70^\circ C$		4.5	-4.5	
	$T_A=25^\circ C$		4.5	-4.3	
	$T_A=70^\circ C$		4.5	-3.8	
Pulsed Drain Current		I_{DM}	20	-15	
Power Dissipation	$T_C=25^\circ C$	P_D	6.5		W
	$T_C=70^\circ C$		5		
	$T_A=25^\circ C$		1.9		
	$T_A=70^\circ C$		1.2		
Thermal Resistance.Junction- to-Ambient	$t \leq 5s$	R_{thJA}	65		$^\circ C/W$
Thermal Resistance.Junction- to-Case		R_{thJC}	16		
Junction Temperature		T_J	150		$^\circ C$
Storage Temperature Range		T_{stg}	-55 to 150		

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■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Test Conditions	Type	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{DSS}	I _D =250 μA, V _{GS} =0V	N-CH	12			V
		I _D =-250 μA, V _{GS} =0V	P-CH	-12			
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =12V, V _{GS} =0V	N-CH			1	μA
		V _{DS} =-12V, V _{GS} =0V	P-CH			-1	
		V _{DS} =12V, V _{GS} =0V, T _J =55°C	N-CH			10	
		V _{DS} =-12V, V _{GS} =0V, T _J =55°C	P-CH			-10	
Gate-Body Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±8V	N-CH			±100	nA
		V _{DS} =0V, V _{GS} =±8V	P-CH			±100	
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250 μA	N-CH	0.4		1	V
		V _{DS} =V _{GS} , I _D =-250 μA	P-CH	-0.4		-1	
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =4.5V, I _D =5A	N-CH			29	mΩ
		V _{GS} =2.5V, I _D =4.6A				34	
		V _{GS} =1.8V, I _D =4.1A				44	
		V _{GS} =1.5V, I _D =2A				65	
		V _{GS} =-4.5V, I _D =-3.6A	P-CH			61	
		V _{GS} =-2.5V, I _D =-3.2A				81	
		V _{GS} =-1.8V, I _D =-1A				115	
		V _{GS} =-1.5V, I _D =-1A				170	
On-State Drain Current	I _{D(on)}	V _{DS} ≥5 V, V _{GS} = 4.5 V	N-CH	15			A
		V _{DS} ≥-5 V, V _{GS} = -4.5 V	P-CH	-10			
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =5A	N-CH		21		S
		V _{DS} =-10V, I _D =-3.6A	P-CH		11		
Input Capacitance	C _{iss}	N-Channel: V _{GS} =0V, V _{DS} =6V, f=1MHz	N-CH		500		pF
Output Capacitance	C _{oss}		P-Channel: V _{GS} =0V, V _{DS} =6V, f=1MHz	N-CH		160	
		Reverse Transfer Capacitance	C _{rss}	N-Channel: V _{GS} =0V, V _{DS} =6V, f=1MHz	P-CH		
P-Channel: V _{GS} =0V, V _{DS} =6V, f=1MHz	N-CH				100		
Gate Resistance	R _g	V _{GS} =0V, f=1MHz	N-CH	0.7		7	Ω
			P-CH	2		20	
Total Gate Charge	Q _g	V _{GS} =8V, V _{DS} =6V, I _D =6.5A	N-CH		9.7	15	nC
		V _{GS} =-8V, V _{DS} =-6V, I _D =-4.5A	P-CH		13.1	20	
		N-Channel: V _{GS} =4.5V, V _{DS} =6V, I _D =6.5A	N-CH		5.6	8.5	
			P-CH		8.2	12.5	
Gate Source Charge	Q _{gs}	P-Channel: V _{GS} =-4.5V, V _{DS} =-6V, I _D =-4.3A	N-CH		0.72		
			P-CH		1.2		
Gate Drain Charge	Q _{gd}	N-Channel: V _{GS} =-4.5V, V _{DS} =-6V, I _D =-4.3A	N-CH		0.74		
			P-CH		2.8		

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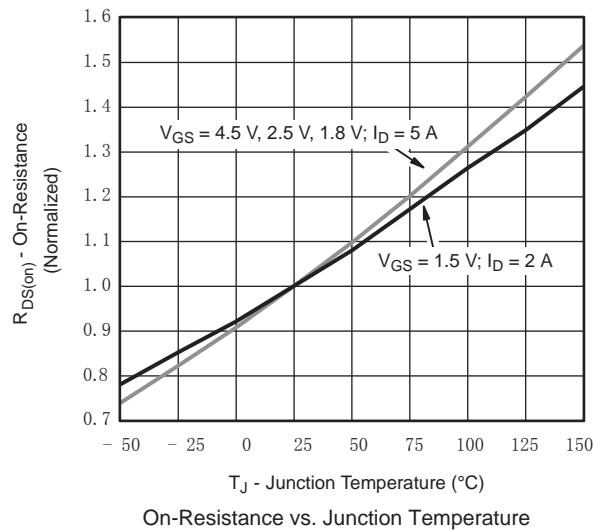
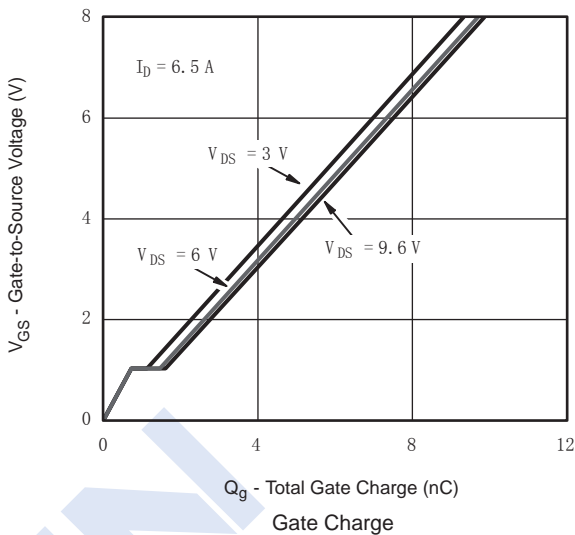
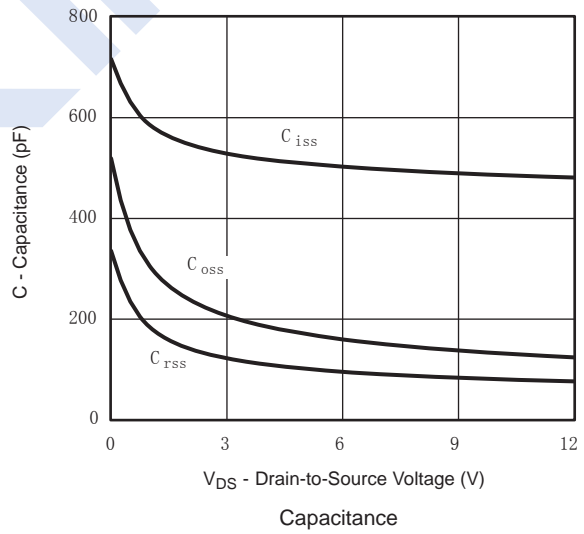
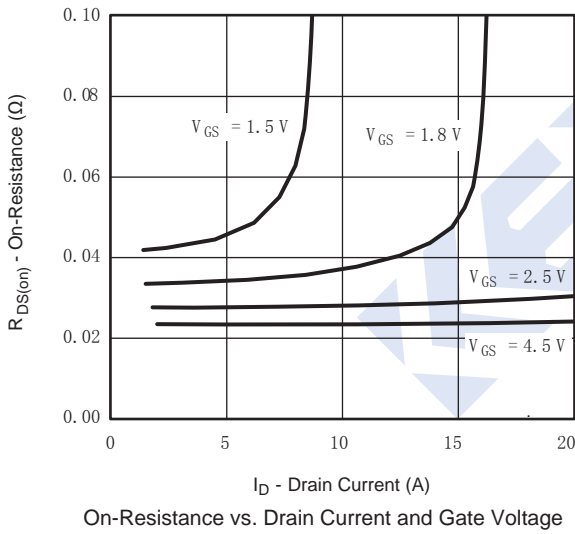
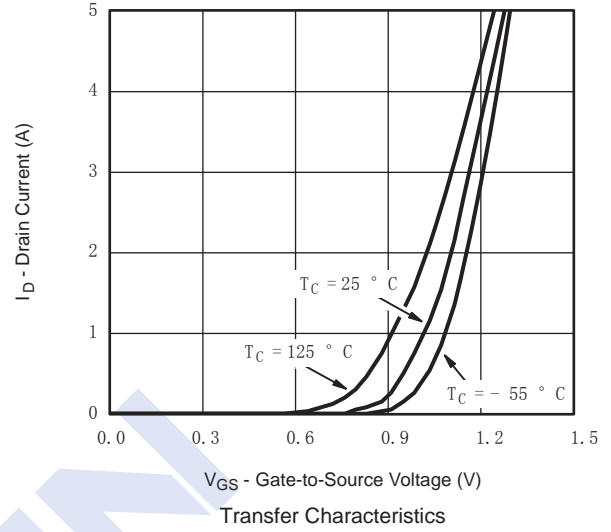
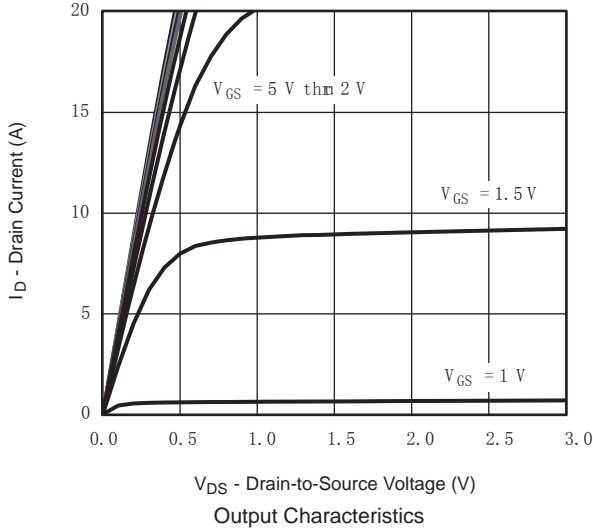
■ Electrical Characteristics Ta = 25°C

Turn-On DelayTime	$t_{d(on)}$	N-Channel: $V_{GS}=4.5V, V_{DS}=6V, I_D=5.2A,$ $R_L=1.2\Omega, R_{GEN}=1\Omega$	N-CH	10	15	ns
			P-CH	30	40	
Turn-On Rise Time	t_r	P-Channel: $V_{GS}=-4.5V, V_{DS}=-6V, I_D=-3.8A,$ $R_L=1.6\Omega, R_{GEN}=1\Omega$	N-CH	10	15	
			P-CH	25	40	
Turn-Off DelayTime	$t_{d(off)}$		N-CH	22	30	
			P-CH	30	45	
Turn-Off Fall Time	t_f		N-CH	10	15	
			P-CH	20	30	
Turn-On DelayTime	$t_{d(on)}$	N-Channel: $V_{GS}=10V, V_{DS}=6V, I_D=5.2A,$ $R_L=1.2\Omega, R_{GEN}=1\Omega$	N-CH	5	10	ns
			P-CH	8	15	
Turn-On Rise Time	t_r	P-Channel: $V_{GS}=-10V, V_{DS}=-6V, I_D=-3.8A,$ $R_L=1.6\Omega, R_{GEN}=1\Omega$	N-CH	10	15	
			P-CH	12	20	
Turn-Off DelayTime	$t_{d(off)}$		N-CH	18	30	
			P-CH	25	40	
Turn-Off Fall Time	t_f		N-CH	10	15	
			P-CH	18	30	
Body Diode Reverse Recovery Time	t_{rr}	N-Channel $I_F=5.2A, di/dt = 100A/\mu s, T_J = 25^\circ C$ P-Channel $I_F=-3.8A, di/dt = -100 A/\mu s, T_J = 25^\circ C$	N-CH	20	40	nC
			P-CH	30	60	
Body Diode Reverse Recovery Charge	Q_{rr}		N-CH	5	10	nC
			P-CH	12	24	
Reverse Recovery Fall Time	t_a		N-CH	8		
			P-CH	16		
Reverse Recovery Rise Time	t_b		N-CH	12		
			P-CH	14		
Maximum Body-Diode Continuous Current	I_S	$T_c = 25^\circ C$	N-CH		4.5	A
			P-CH		-4.5	
Pulsed Body-Diode Current *	I_{SM}		N-CH		20	
			P-CH		-10	
Diode Forward Voltage	V_{SD}	$I_S=5.2A, V_{GS}=0V$	N-CH		1.2	V
		$I_S=-3.4A, V_{GS}=0V$	P-CH		-1.2	

Note. Pulse test; pulse width $\leq 300 \mu s$, duty cycle $\leq 2\%$.

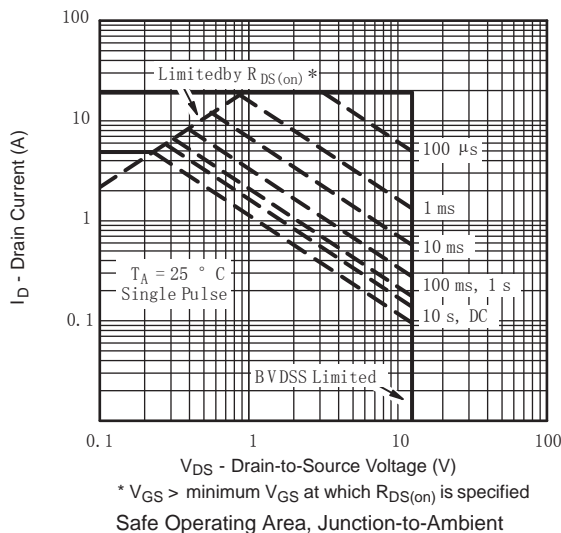
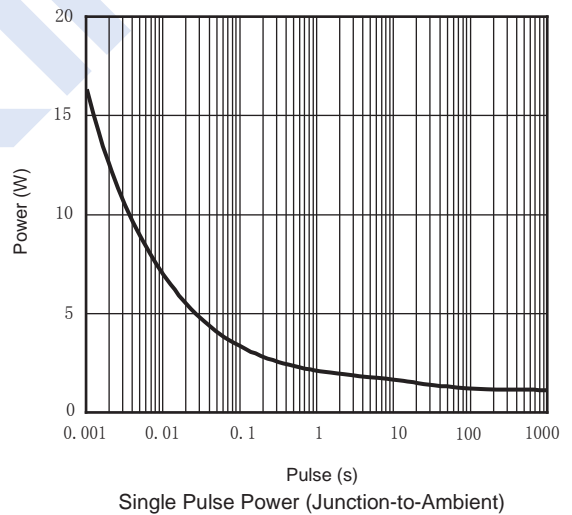
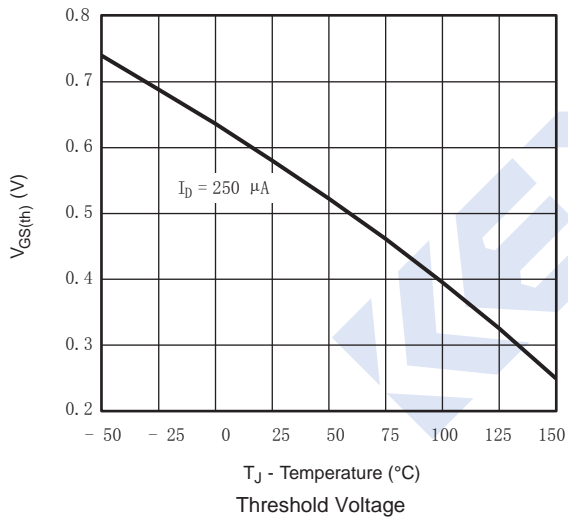
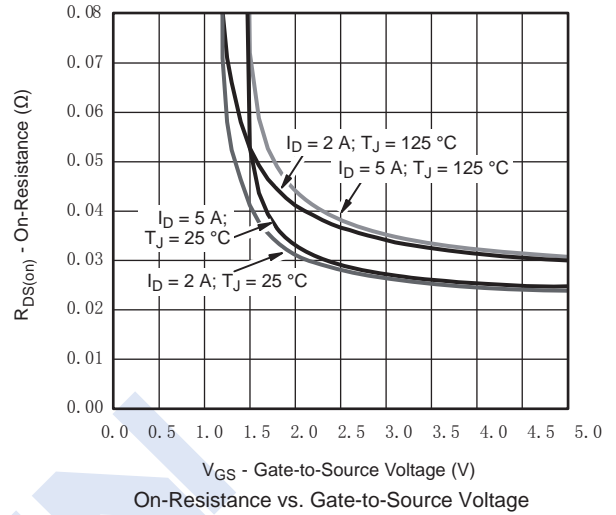
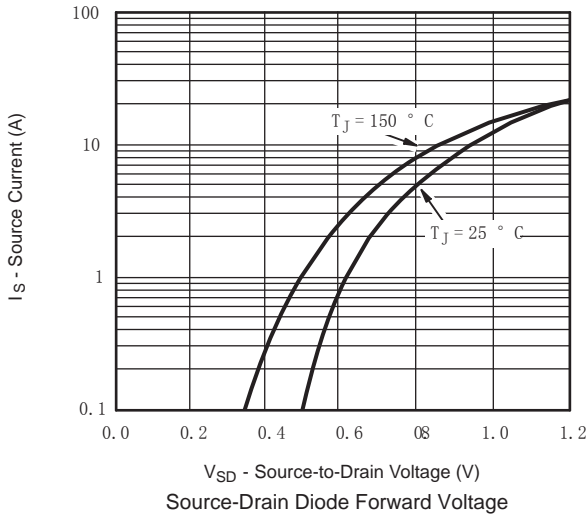
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■ N-Channel Typical Characteristics



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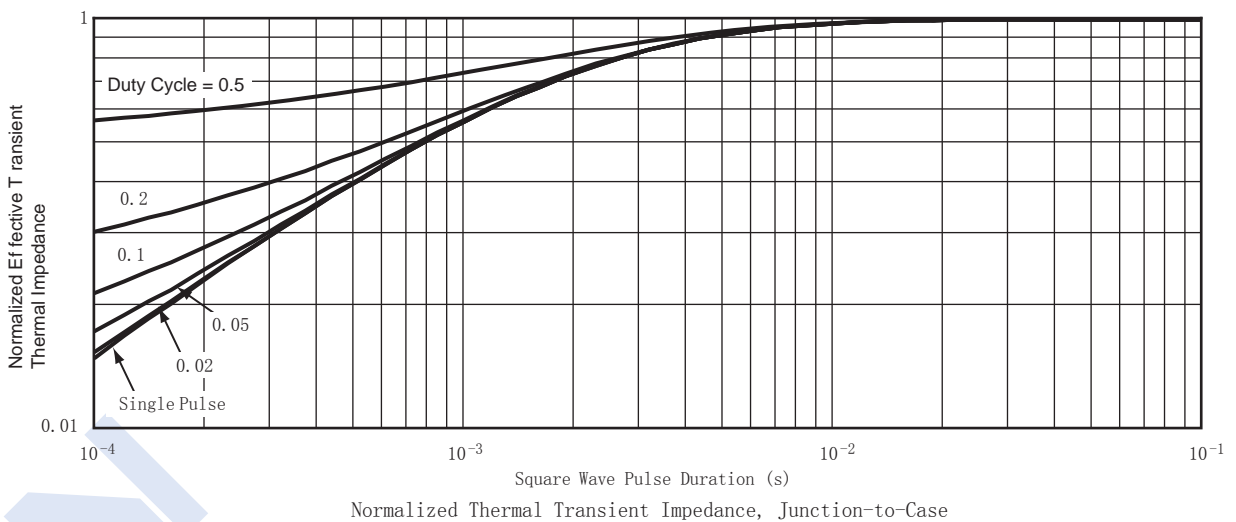
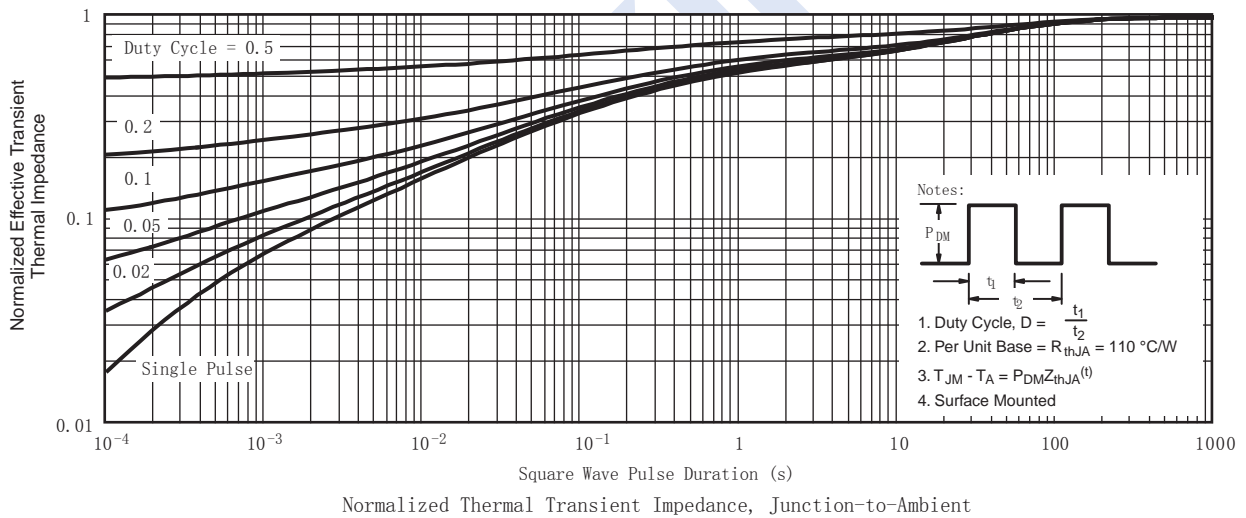
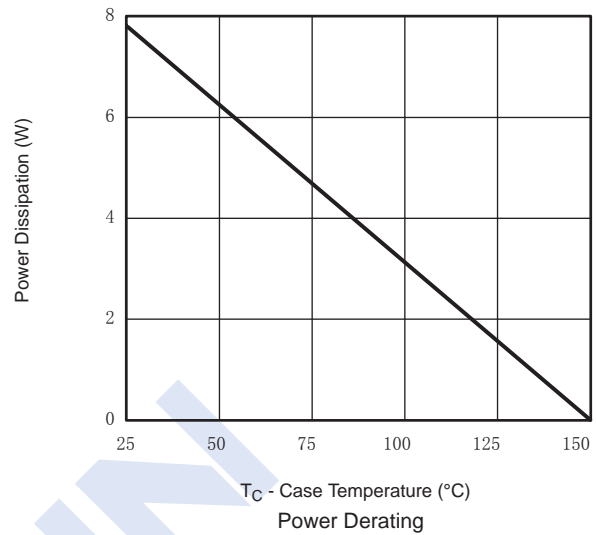
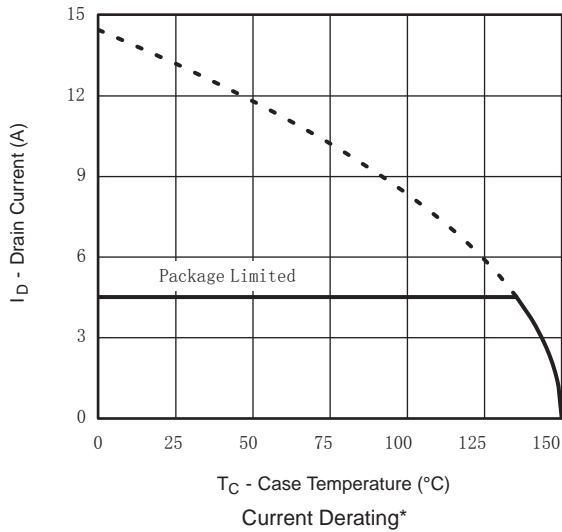
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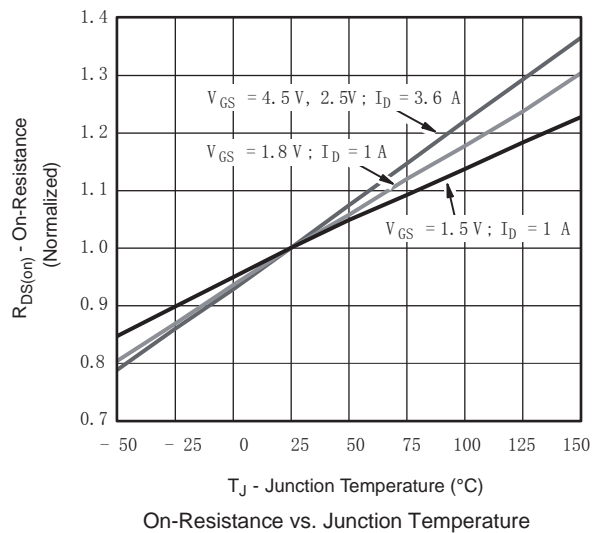
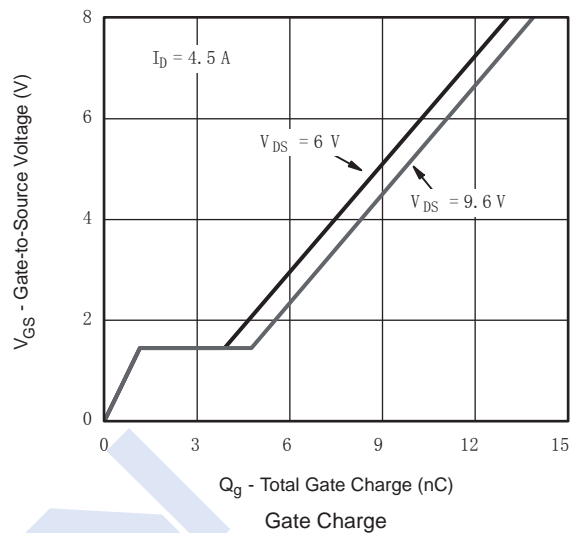
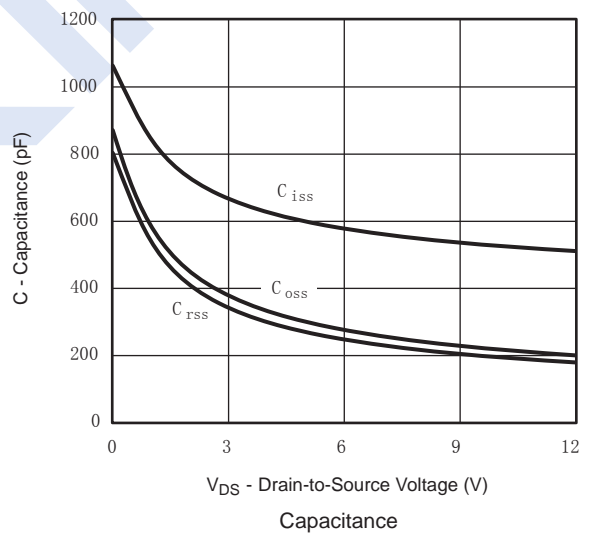
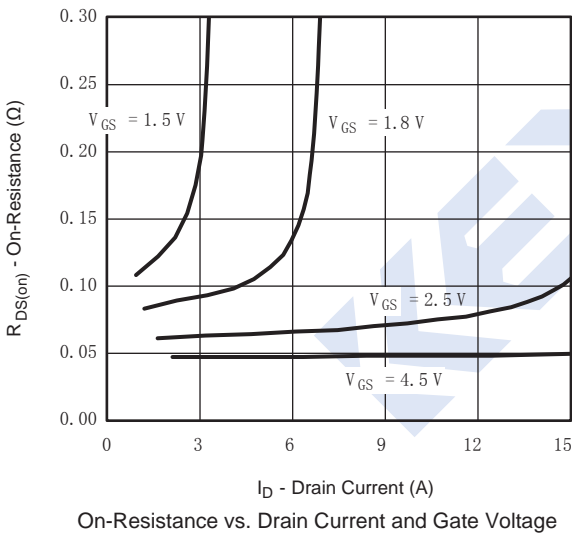
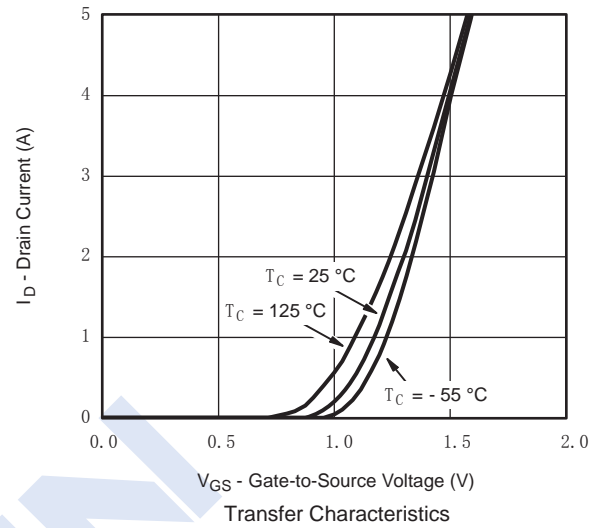
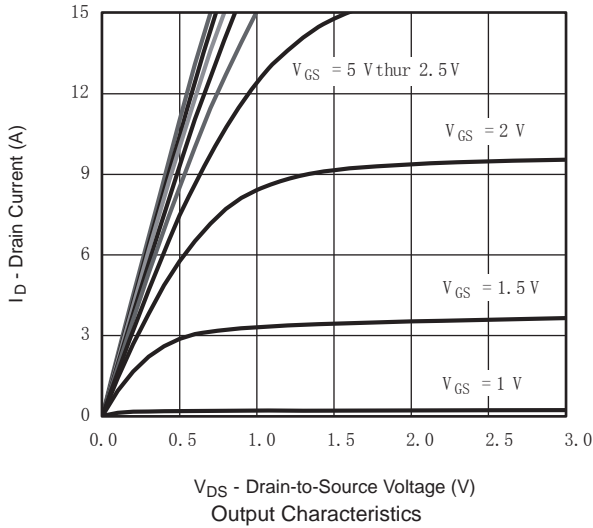
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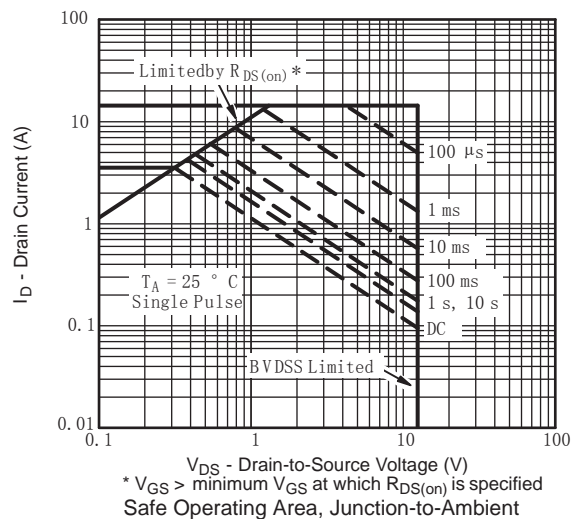
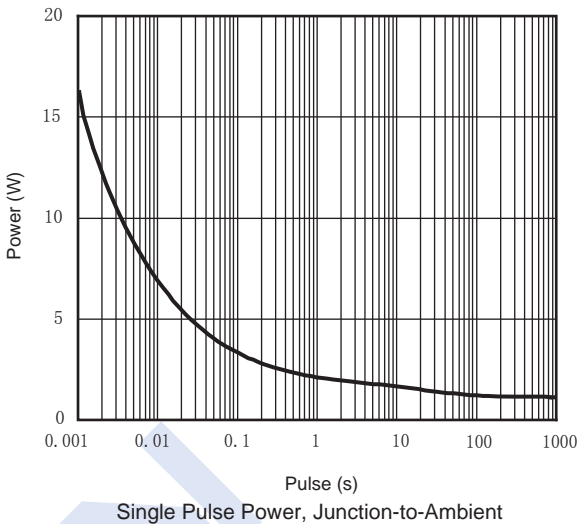
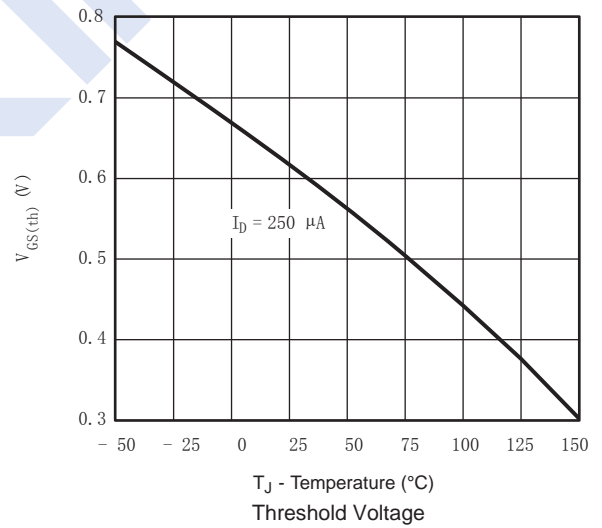
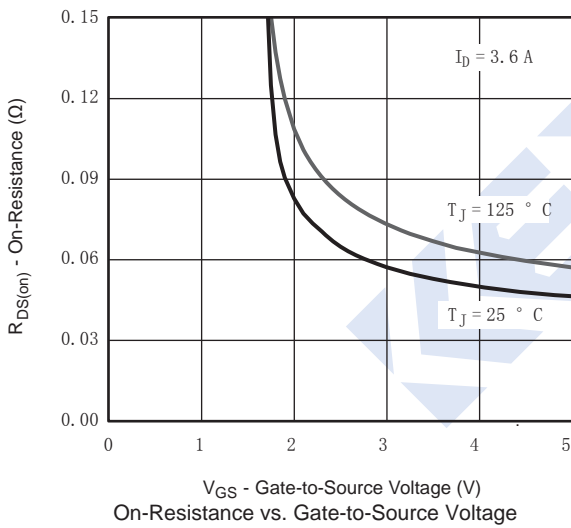
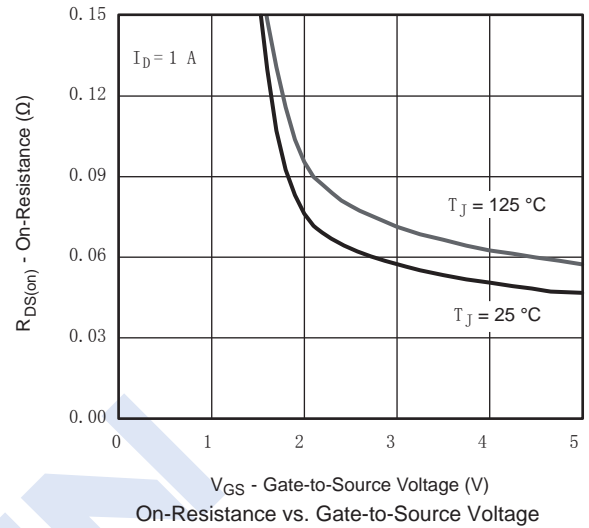
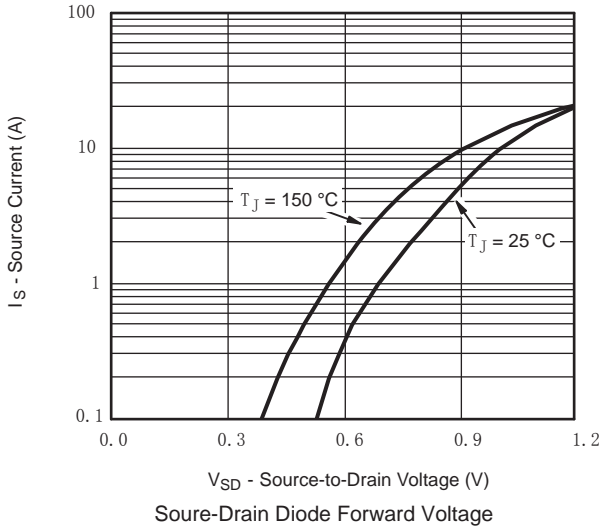
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■ P-Channel Typical Characteristics



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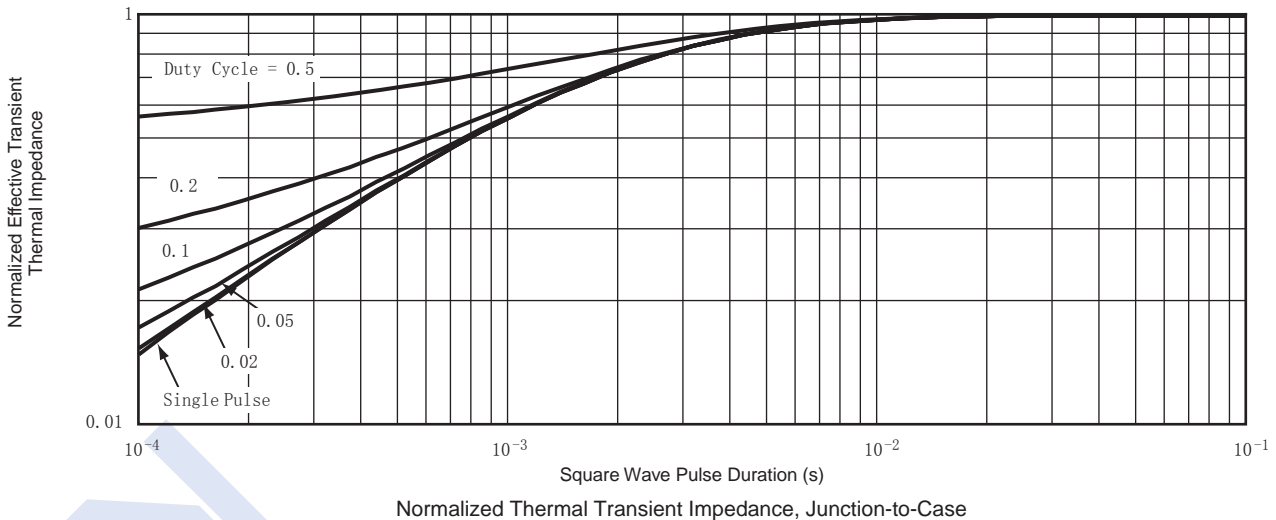
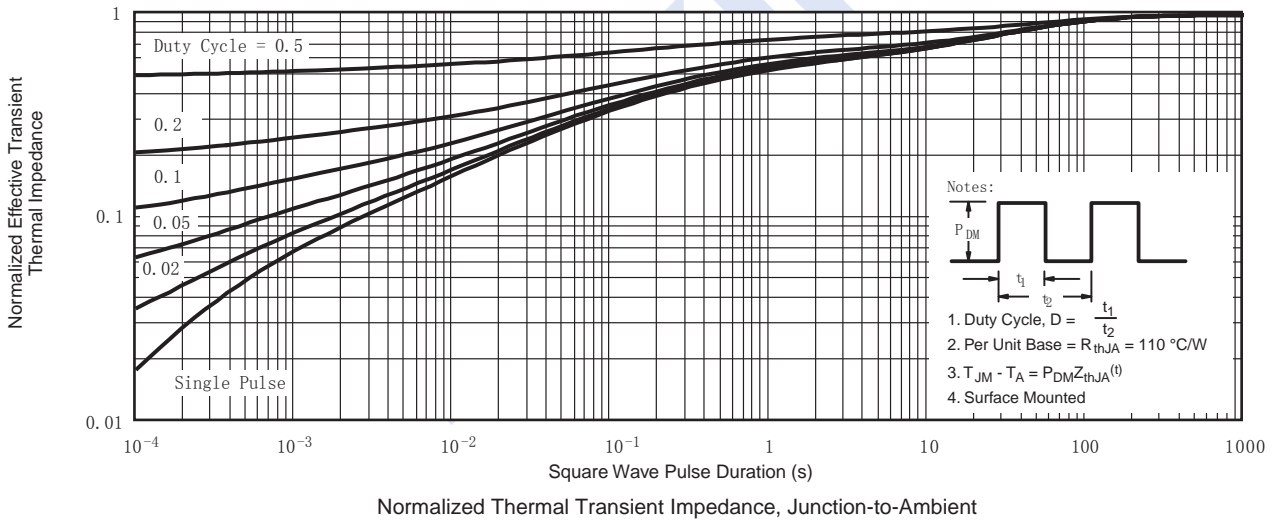
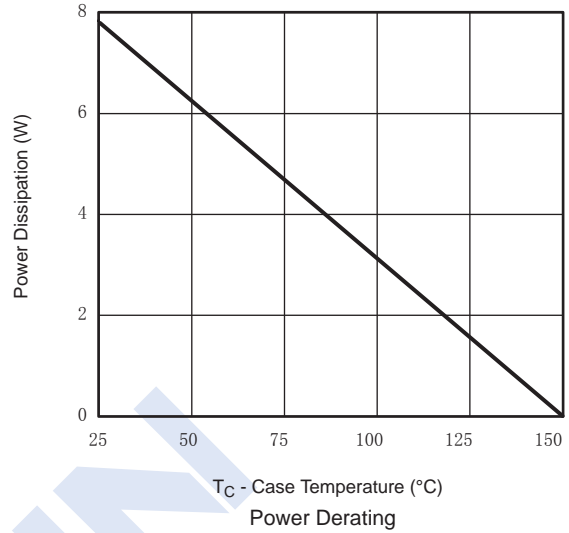
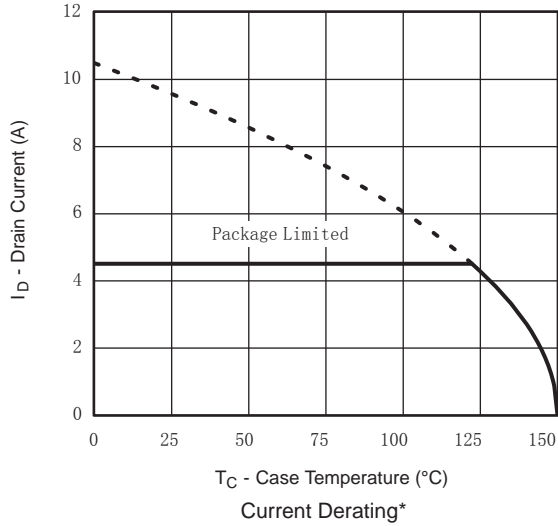
■ P-Channel Typical Characteristics



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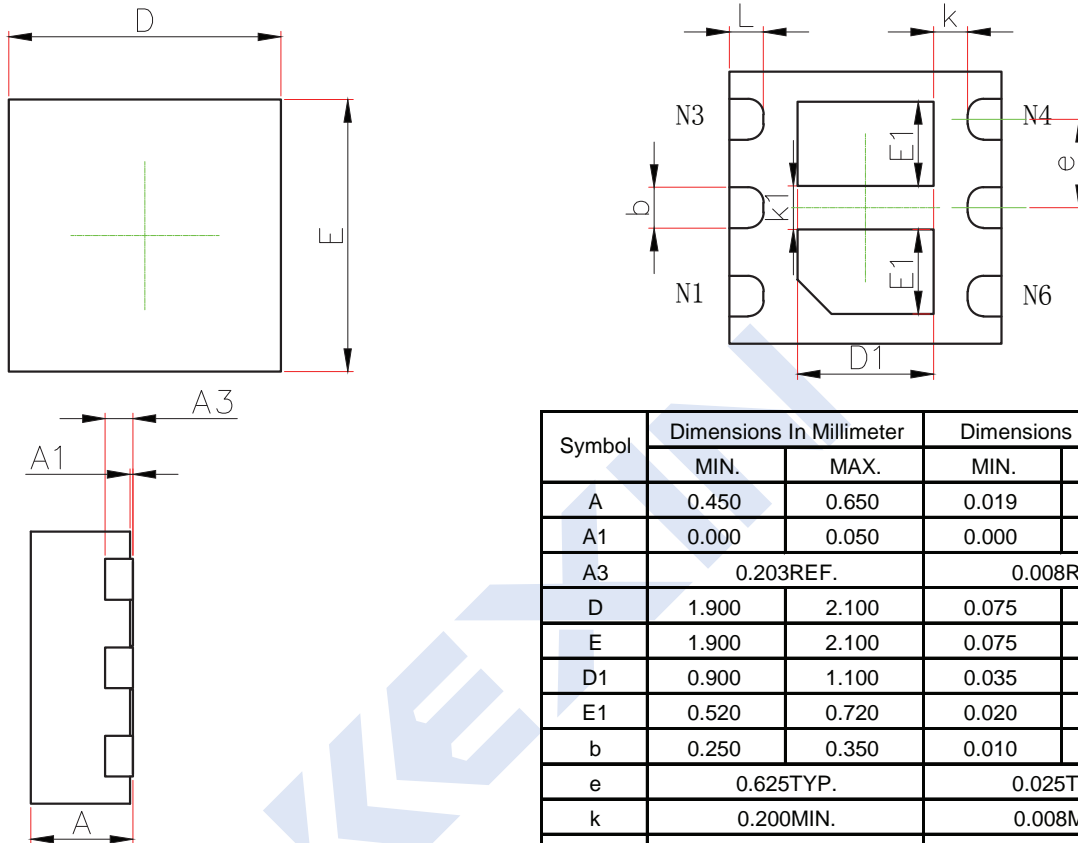
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■ P-Channel Typical Characteristics

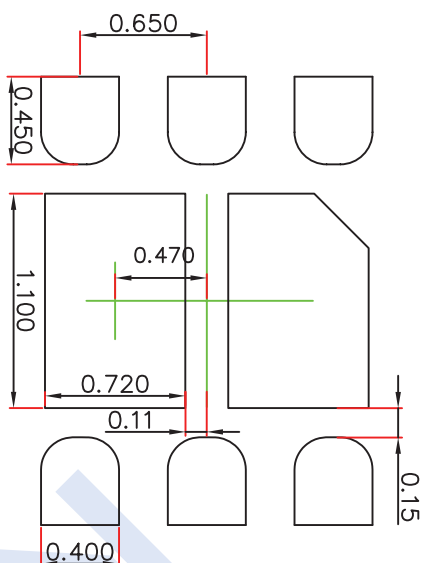


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DFN2X2-6 Package Outline Dimensions



Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters,
2. General tolerance: $\pm 0.050\text{mm}$,
3. The pad layout is for reference purposes only.