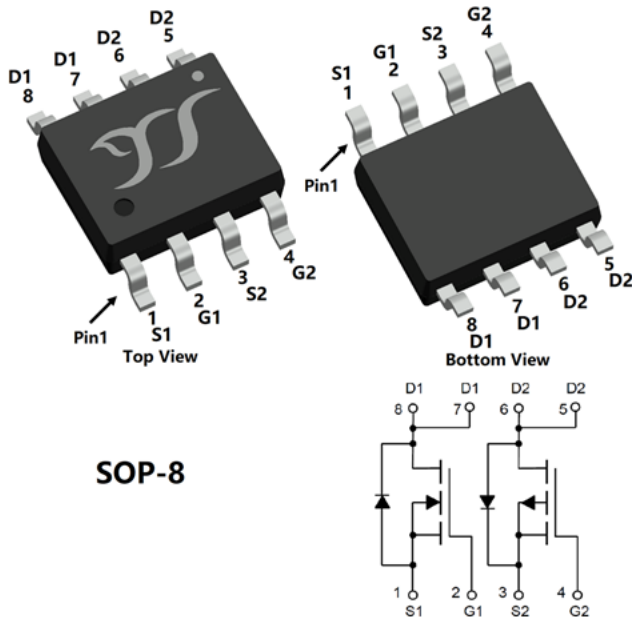


N-Channel and P-Channel Complementary MOSFET



Product Summary

NMOS

• V_{DS}	40V
• I_D	7A
• $R_{DS(ON)}$ (at $V_{GS}=10V$)	<16m Ω
• $R_{DS(ON)}$ (at $V_{GS}=4.5V$)	<21m Ω

PMOS

• V_{DS}	-40V
• I_D	-5A
• $R_{DS(ON)}$ (at $V_{GS}=-10V$)	<32m Ω
• $R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	<46m Ω
• 100% EAS Tested	

General Description

- High density cell design for low $R_{DS(ON)}$
- High Speed switching
- Excellent stability and uniformity
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power switching application
- Uninterruptible power supply
- Load switch
- Portable equipment

Limiting Values

Parameter	Conditions			Symbol	NMOS		PMOS		Unit
					Min	Max	Min	Max	
Drain-source Voltage				V _{DS}	-	40	-	-40	V
Gate-source Voltage				V _{GS}	-20	20	-20	20	
Continuous Drain Current (Note 1,2)	Steady-State	T _A =25°C	NMOS:V _{GS} =10V, PMOS:V _{GS} =-10V	I _D	-	7	-	-5	A
		T _A =100°C			-	4.4	-	-3.2	
Pulsed Drain Current	T _A =25°C,t _p ≤10μs			I _{DM}	-	56	-	-40	
Maximum Body-Diode Continuous Current	T _A =25°C			I _S	-	1.6	-	-1.5	
Avalanche Energy (non-repetitive)	NMOS:T _J =25°C,V _G =10V,R _G =25Ω,L=0.5mH,I _{AS} =14A			EAS	-	49	-	50	mJ
	PMOS:T _J =25°C,V _G =-10V,R _G =25Ω,L=1mH,I _{AS} =-10A								
Total Power Dissipation (Note 1,2)	Steady-State	T _A =25°C		P _D	-	1.43	-	1.38	W
		T _A =100°C			-	0.57	-	0.55	
Junction and Storage Temperature Range				T _J , T _{STG}	-55	150	-55	150	°C

Thermal Resistance

Parameter	Symbol	NMOS		PMOS		Units
		Typ	Max	Typ	Max	
Thermal Resistance Junction-to-Ambient (Note 2)	$R_{\theta JA}$	-	87	-	90	$^{\circ}C/W$

Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJS016NP04A	F2	016NP04A	4000	8000	64000	13" reel



YJS016NP04A

■ NMOS Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _b =250μA, T _j =25°C	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V, T _j =25°C	-	-	1	μA
		V _{DS} =40V, V _{GS} =0V, T _j =150°C	-	-	100	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V, T _j =25°C	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA, T _j =25°C	1	1.5	2	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =7A, T _j =25°C	-	12.5	16	mΩ
		V _{GS} =4.5V, I _D =4A, T _j =25°C	-	15.6	21	
Diode Forward Voltage	V _{SD}	I _S =1.6A, V _{GS} =0V, T _j =25°C	-	0.74	1.2	V
Gate Resistance	R _G	f=1MHz, T _j =25°C	-	3	-	Ω
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f=1MHz, T _j =25°C	-	1012	-	pF
Output Capacitance	C _{oss}		-	96	-	
Reverse Transfer Capacitance	C _{rss}		-	84	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V, V _{DS} =20V, I _D =7A, T _j =25°C	-	21.5	-	nC
Gate-Source Charge	Q _{gs}		-	3	-	
Gate-Drain Charge	Q _{gd}		-	4.5	-	
Reverse Recovery Charge	Q _{rr}	I _F =7A, di/dt=100A/μs, V _{GS} =0V, V _R =20V, T _j =25°C	-	8	-	nC
Reverse Recovery Time	t _{rr}		-	13	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DS} =20V, I _D =7A, R _{GEN} =3Ω, T _j =25°C	-	7	-	ns
Turn-on Rise Time	t _r		-	3.5	-	
Turn-off Delay Time	t _{D(off)}		-	29	-	
Turn-off Fall Time	t _f		-	6	-	



YJS016NP04A

■ PMOS Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A, T_j=25^{\circ}C$	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-40V, V_{GS}=0V, T_j=25^{\circ}C$	-	-	-1	μA
		$V_{DS}=-40V, V_{GS}=0V, T_j=150^{\circ}C$	-	-	-100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V, T_j=25^{\circ}C$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A, T_j=25^{\circ}C$	-1.1	-1.6	-2.1	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-5A, T_j=25^{\circ}C$	-	24.6	32	m Ω
		$V_{GS}=-4.5V, I_D=-3A, T_j=25^{\circ}C$	-	33.4	46	
Diode Forward Voltage	V_{SD}	$I_S=-1.5A, V_{GS}=0V, T_j=25^{\circ}C$	-	-0.78	-1.2	V
Gate Resistance	R_G	$f=1MHz, T_j=25^{\circ}C$	-	16	-	Ω
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{DS}=-20V, V_{GS}=0V, f=1MHz, T_j=25^{\circ}C$	-	1135	-	pF
Output Capacitance	C_{oss}		-	118	-	
Reverse Transfer Capacitance	C_{rss}		-	105	-	
Switching Parameters						
Total Gate Charge	Q_g	$V_{GS}=-10V, V_{DS}=-20V, I_D=-5A, T_j=25^{\circ}C$	-	26	-	nC
Gate-Source Charge	Q_{gs}		-	3.6	-	
Gate-Drain Charge	Q_{gd}		-	4.3	-	
Reverse Recovery Charge	Q_{rr}	$I_F=-5A, di/dt=100A/us, V_{GS}=0V, V_R=-20V, T_j=25^{\circ}C$	-	23	-	nC
Reverse Recovery Time	t_{rr}		-	31	-	ns
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=-10V, V_{DS}=-20V, I_D=-5A, R_{GEN}=3\Omega, T_j=25^{\circ}C$	-	7	-	ns
Turn-on Rise Time	t_r		-	3.8	-	
Turn-off Delay Time	$t_{D(off)}$		-	90	-	
Turn-off Fall Time	t_f		-	53	-	

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of $150^\circ C$. The value in any given application depends on the user's specific board design.



■ NMOS Typical Electrical and Thermal Characteristics Diagrams

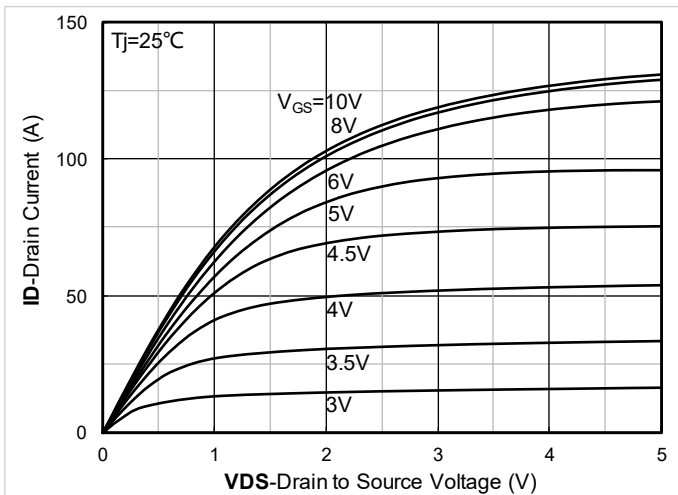


Figure 1. Output Characteristics; typical values

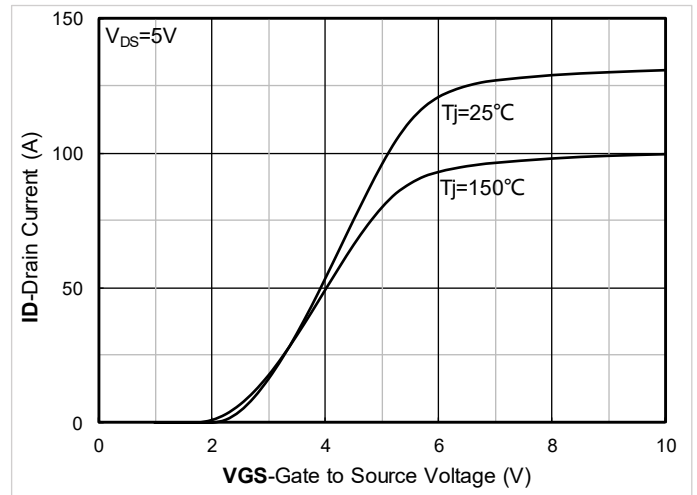


Figure 2. Transfer Characteristics; typical values

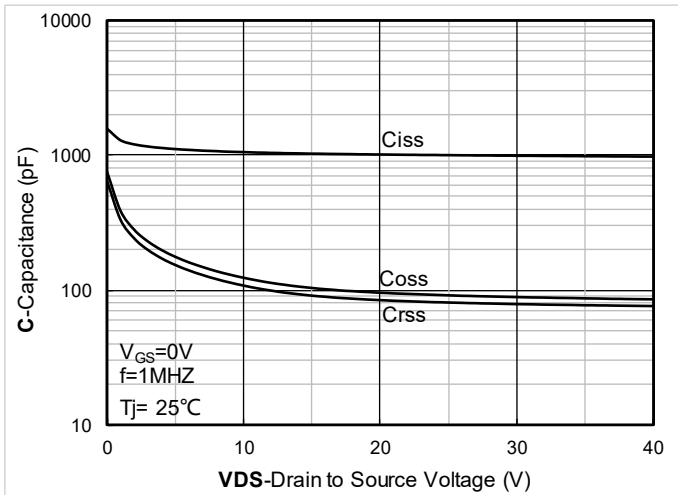


Figure 3. Capacitance Characteristics; typical values

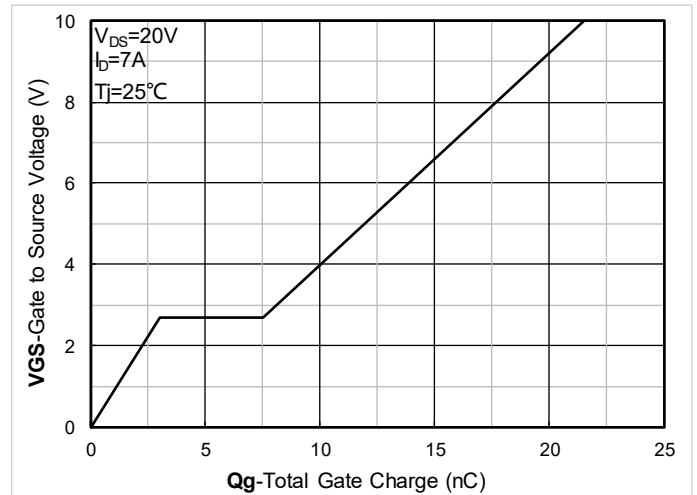


Figure 4. Gate Charge; typical values

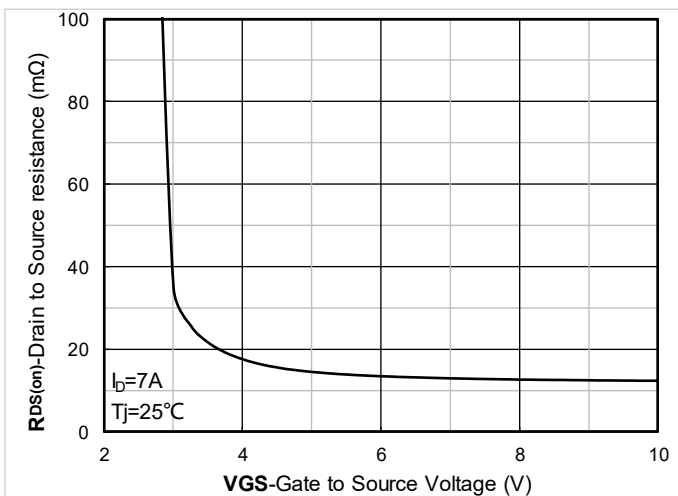


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

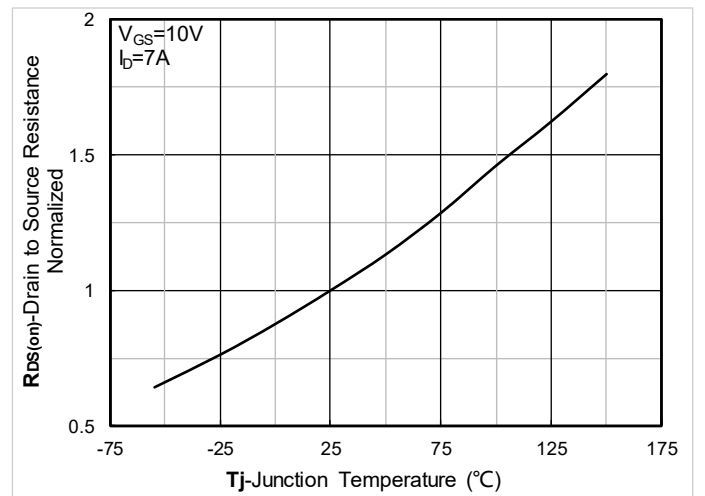


Figure 6. Normalized On-Resistance

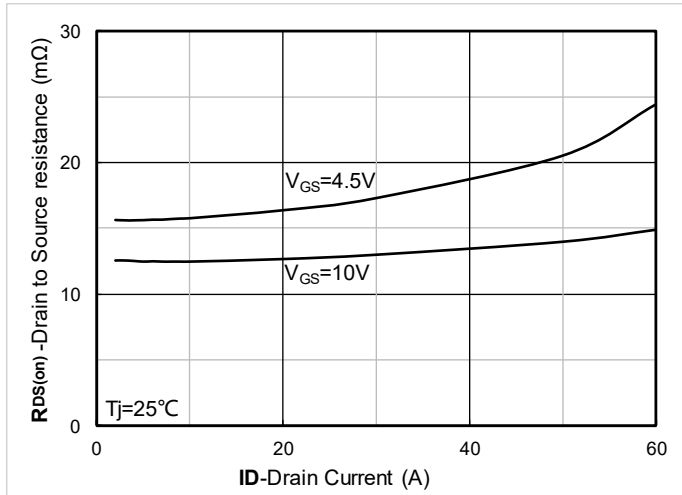


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

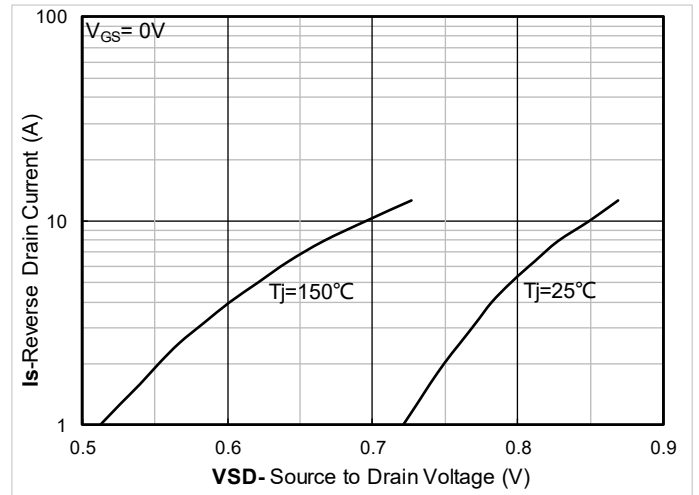


Figure 8. Forward characteristics of reverse diode; typical values

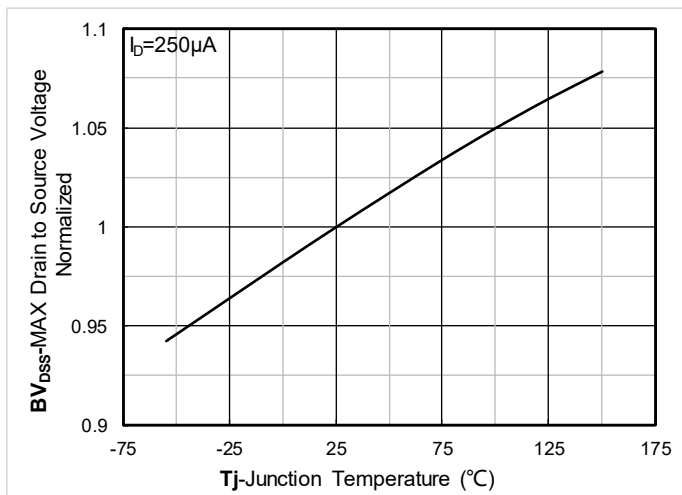


Figure 9. Normalized breakdown voltage

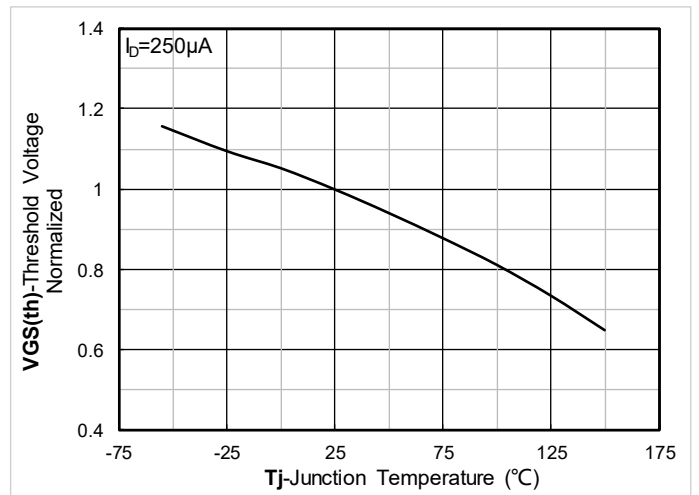


Figure 10. Normalized Threshold voltage

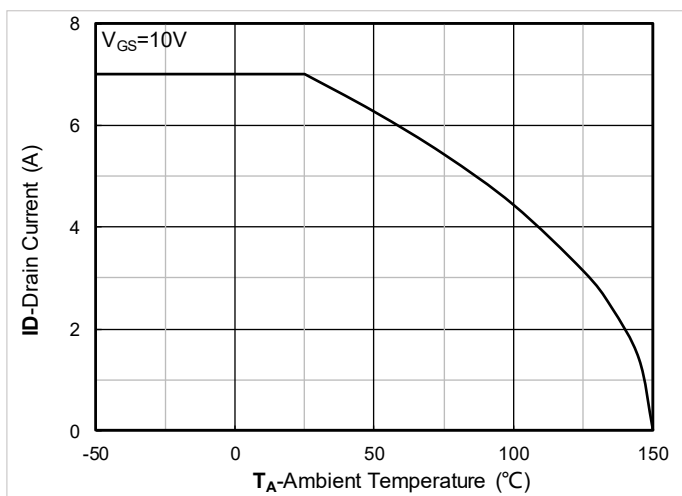


Figure 11. Current dissipation

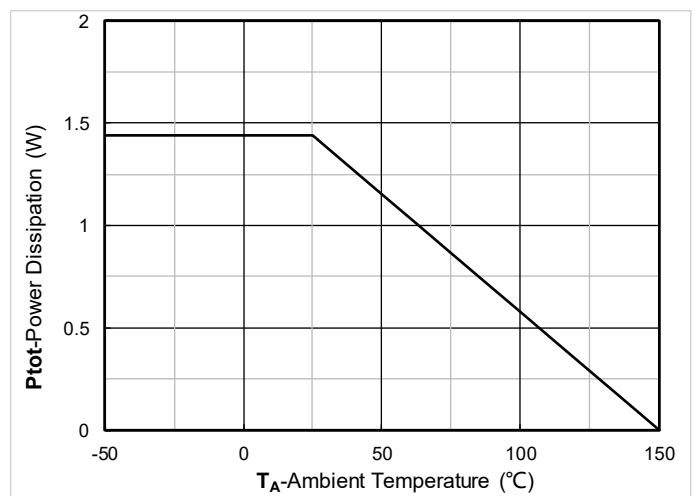


Figure 12. Power dissipation

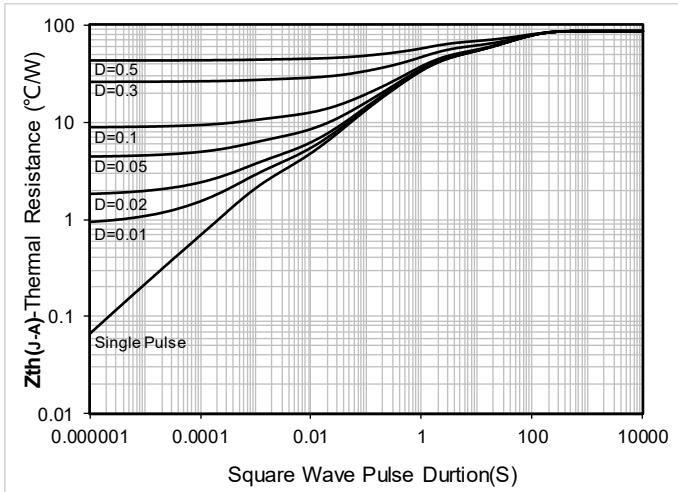


Figure 13. Maximum Transient Thermal Impedance

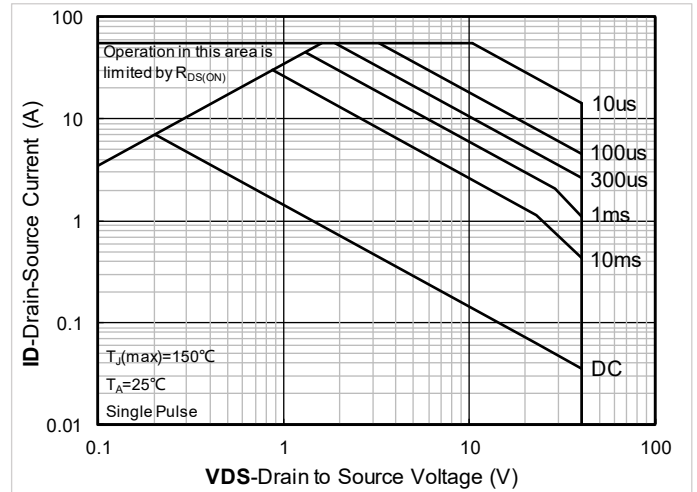


Figure 14. Safe Operation Area

■ PMOS Typical Electrical and Thermal Characteristics Diagrams

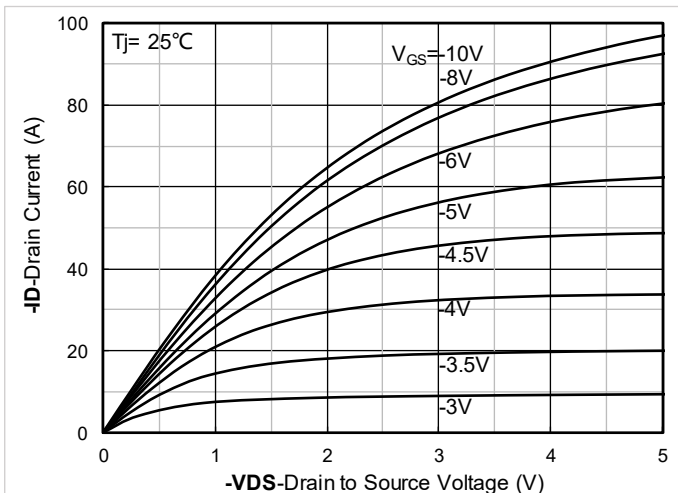


Figure 1. Output Characteristics; typical values

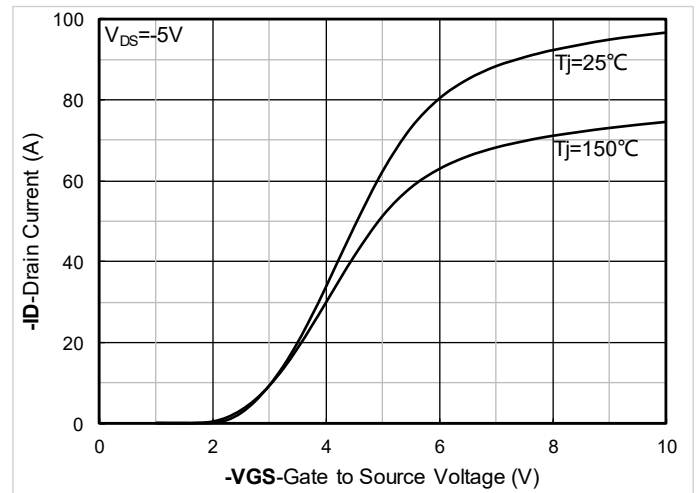


Figure 2. Transfer Characteristics; typical values

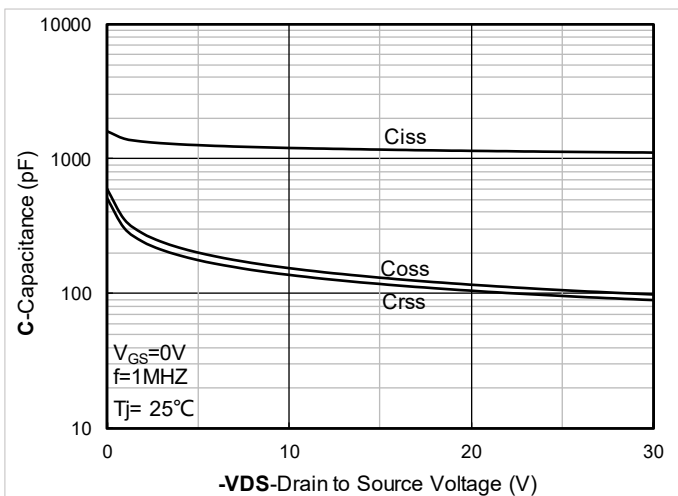


Figure 3. Capacitance Characteristics; typical values

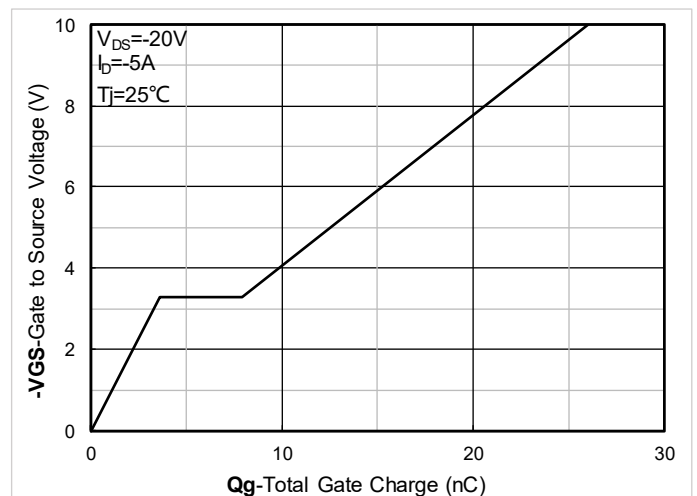


Figure 4. Gate Charge; typical values

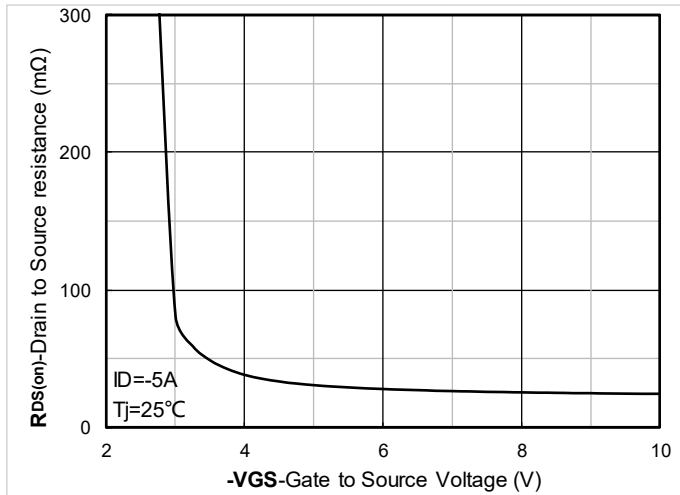


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

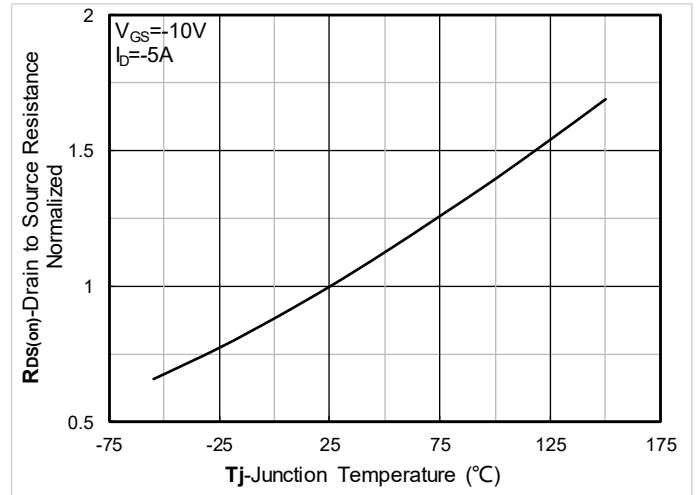


Figure 6. Normalized On-Resistance

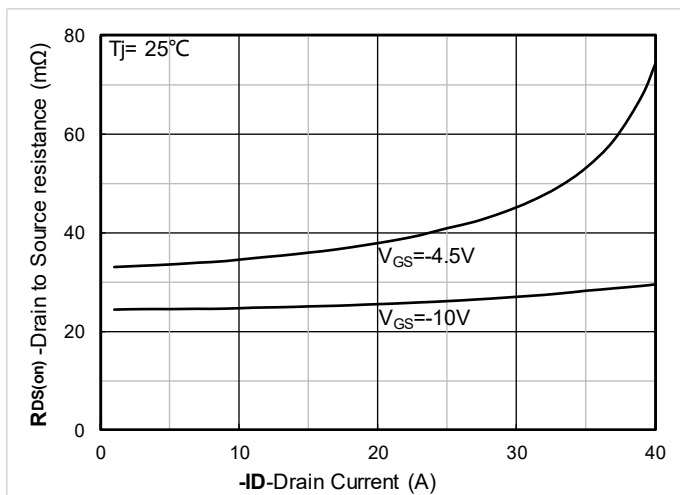


Figure 7. RDS(on) vs. Drain Current; typical values

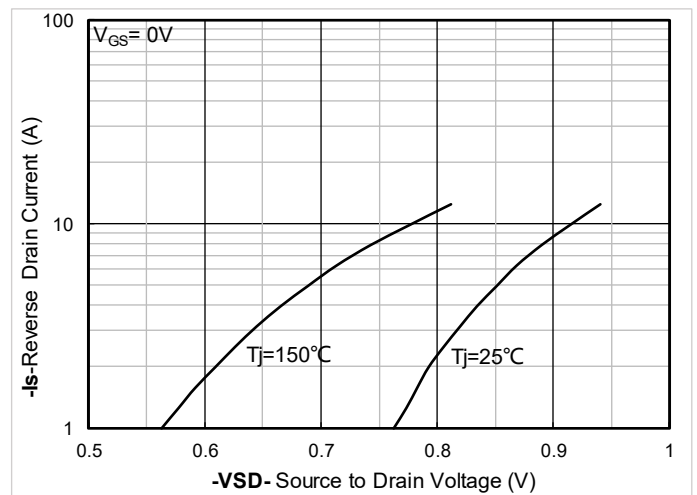


Figure 8. Forward characteristics of reverse diode; typical values

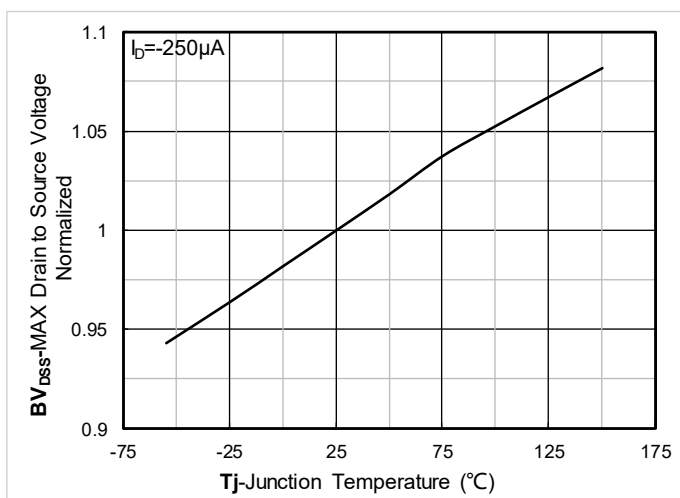


Figure 9. Normalized breakdown voltage

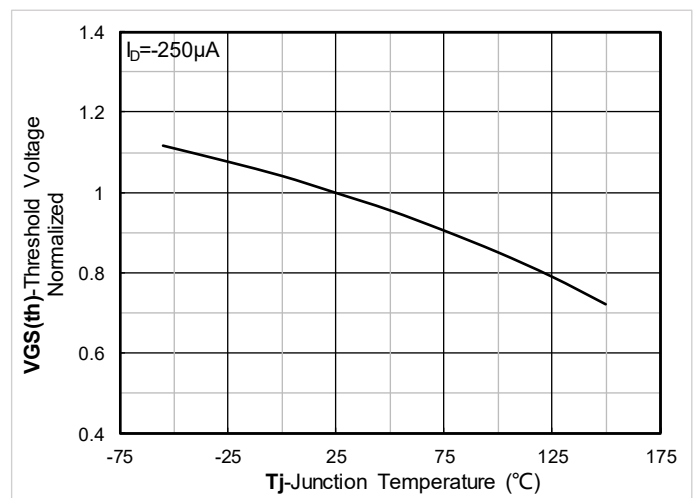


Figure 10. Normalized Threshold voltage

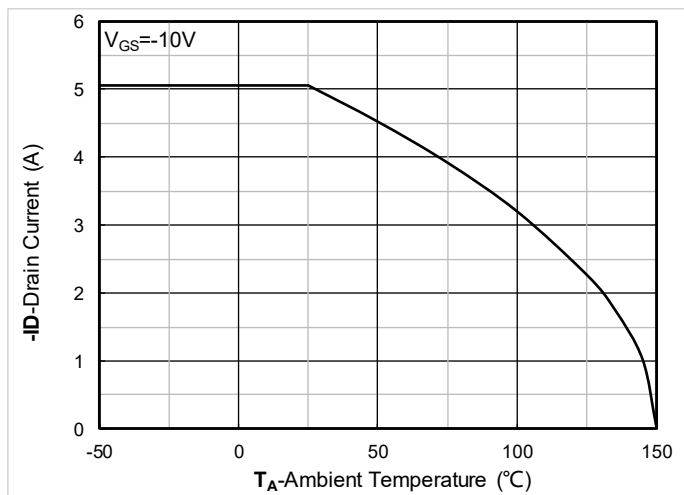


Figure 11. Current dissipation

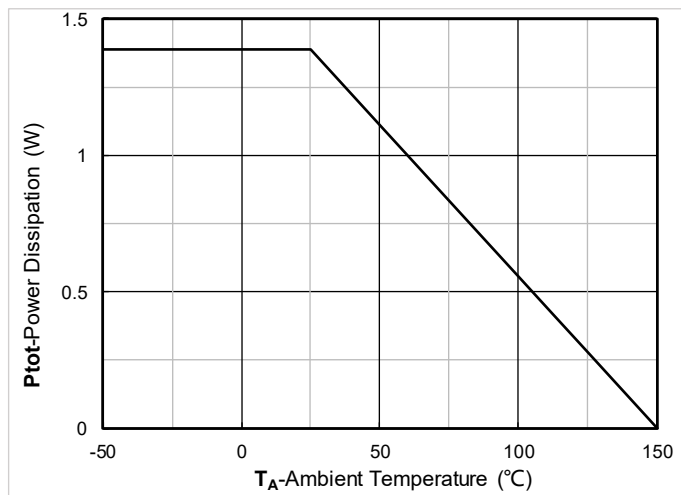


Figure 12. Power dissipation

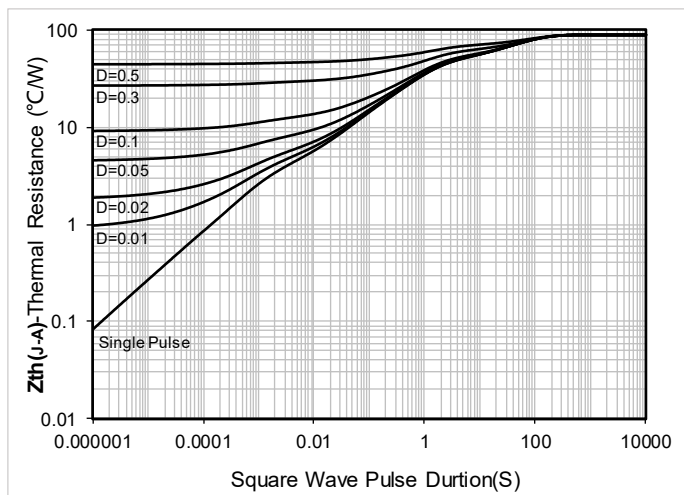


Figure 13. Maximum Transient Thermal Impedance

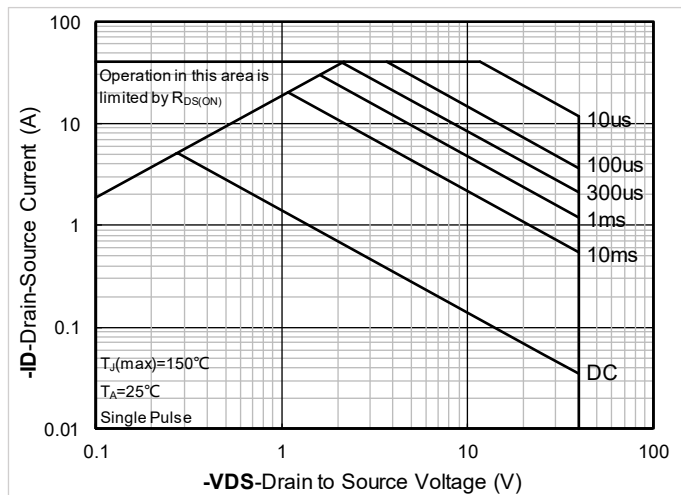
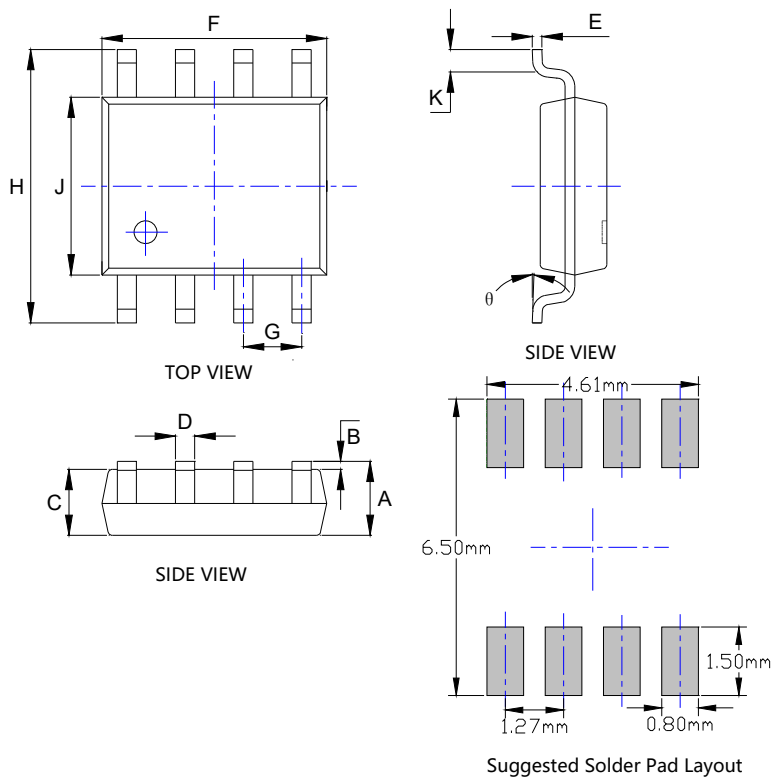


Figure 14. Safe Operation Area



YJS016NP04A

■ SOP-8 Package information

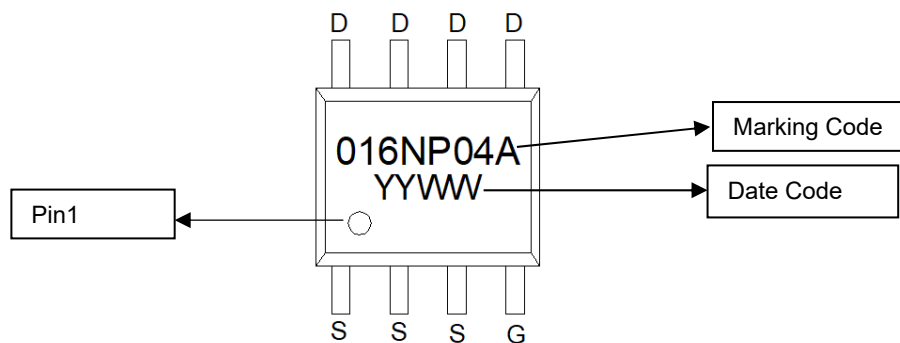


SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.053	0.069	1.350	1.750
B	0.004	0.010	0.100	0.250
C	0.053	0.061	1.350	1.550
D	0.013	0.020	0.330	0.510
E	0.007	0.010	0.170	0.250
F	0.189	0.197	4.800	5.000
G	0.050BSC		1.270BSC	
H	0.228	0.244	5.800	6.200
J	0.150	0.157	3.800	4.000
K	0.016	0.050	0.400	1.270
θ	0°	8°	0°	8°

Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. 016NP04A is marking code, YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black



Disclaimer

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The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), Yangjie or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale.

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