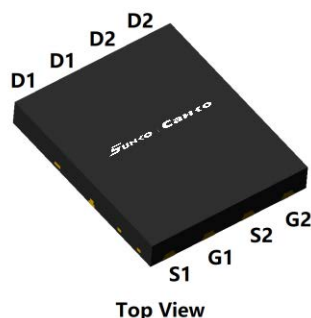
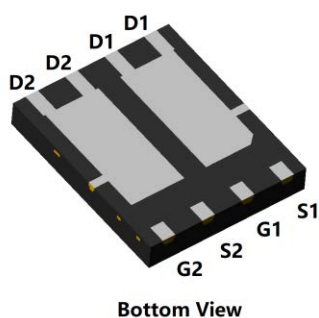


N-Channel and P-Channel Complementary MOSFET

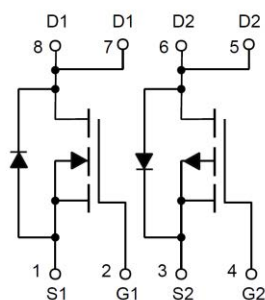


Top View



Bottom View

DFN5060-8L



Product Summary

NMOS

- V_{DS} 60V
- I_D 20A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<30m\Omega$
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) $<40m\Omega$

PMOS

- V_{DS} -60V
- I_D -20A
- $R_{DS(ON)}$ (at $V_{GS}=-10V$) $<45m\Omega$
- $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) $<65m\Omega$

- 100% EAS Tested

General Description

- Trench Power LV MOSFET technology
- Excellent package for heat dissipation
- Moisture Sensitivity Level 3
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

■ Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	NMOS	PMOS	Unit
Drain-source Voltage		V_{DS}	60	-60	V
Gate-source Voltage		V_{GS}	± 20	± 20	V
Drain Current	$T_A=25^\circ C$	I_D	4.5	-3.5	A
	$T_A=100^\circ C$		2.5	-2.2	
	$T_C=25^\circ C$		20	-20	
	$T_C=100^\circ C$		12.5	-12.5	
Pulsed Drain Current ^A		I_{DM}	50	-50	A
Avalanche energy ^B		EAS	30	84	mJ
Total Power Dissipation ^C	$T_A=25^\circ C$	P_D	1.6	1.7	W
	$T_A=100^\circ C$		0.6	0.7	
	$T_C=25^\circ C$		35	50	
	$T_C=100^\circ C$		14	20	
Junction and Storage Temperature Range		T_J, T_{STG}	-55~+150	-55~+150	$^\circ C$

SCG20NP06A

■ Thermal resistance

Parameter		Symbol	NMOS		PMOS		Units
			Typ	Max	Typ	Max	
Thermal Resistance Junction-to-Ambient	Steady-State	$R_{\theta JA}$	60	75	55	70	$^{\circ}\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	3	3.5	2	2.5	

■ Ordering Information (Example)

PREFERED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
SCG20NP06A	F1	SCG20NP06A	5000	10000	100000	13" reel

■ NMOS Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D =250μA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
		V _{DS} =60V, V _{GS} =0V, T _j =150℃	-	-	100	
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =250μA	1	1.5	2.5	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A	-	24	30	mΩ
		V _{GS} =4.5V, I _D =10A	-	28	40	
Diode Forward Voltage	V _{SD}	I _S =20A, V _{GS} =0V	-	0.9	1.2	V
Gate resistance	R _G	f=1MHz, Open drain	-	2.3	-	Ω
Maximum Body-Diode Continuous Current	I _S		-	-	20	A
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =30V, V _{GS} =0V, f=1MHz	-	1180	-	pF
Output Capacitance	C _{oss}		-	70	-	
Reverse Transfer Capacitance	C _{rss}		-	60	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V, V _{DS} =30V, I _D =10A	-	26	-	nC
Gate-Source Charge	Q _{gs}		-	5.4	-	
Gate-Drain Charge	Q _{gd}		-	6.5	-	
Reverse Recovery Charge	Q _{rr}	I _F =10A, di/dt=500A/us	-	12	-	nC
Reverse Recovery Time	t _{rr}		-	23	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DD} =30V, I _D =10A R _{GEN} =2.2Ω	-	10	-	ns
Turn-on Rise Time	t _r		-	20	-	
Turn-off Delay Time	t _{D(off)}		-	29	-	
Turn-off fall Time	t _f		-	21	-	

SCG20NP06A

■ PMOS Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D =-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V	-	-	-1	μA
		V _{DS} =-60V, V _{GS} =0V, T _j =150℃	-	-	-100	
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =-250μA	-1.3	-1.9	-2.5	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A	-	35	45	mΩ
		V _{GS} =-4.5V, I _D =-10A	-	49	65	
Diode Forward Voltage	V _{SD}	I _S =-20A, V _{GS} =0V	-	-1	-1.2	V
Gate resistance	R _G	f=1MHz, Open drain	-	12	-	Ω
Maximum Body-Diode Continuous Current	I _S		-	-	-20	A
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, f=1MHz	-	1060	-	pF
Output Capacitance	C _{oss}		-	400	-	
Reverse Transfer Capacitance	C _{rss}		-	20	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =-10V, V _{DS} =-30V, I _D =-10A	-	18.7	-	nC
Gate-Source Charge	Q _{gs}		-	4.7	-	
Gate-Drain Charge	Q _{gd}		-	3	-	
Reverse Recovery Charge	Q _{rr}	I _F =-10A, di/dt=100A/us	-	8	-	nC
Reverse Recovery Time	t _{rr}		-	20	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =-10V, V _{DD} =-30V, ID=-10A R _{GEN} =2.2Ω	-	7.5	-	ns
Turn-on Rise Time	t _r		-	40	-	
Turn-off Delay Time	t _{D(off)}		-	43	-	
Turn-off fall Time	t _f		-	55	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. NMOS: T_J=25°C, V_{DD}=50V, V_G=10V, R_G=25Ω, L=0.5mH, I_{AS}=11A.

PMOS: T_J=25°C, V_{DD}=-50V, V_G=-10V, R_G=25Ω, L=1mH, I_{AS}=-13A.

C. P_d is based on max. junction temperature, using junction-case thermal resistance.

D. The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in the still air environment with T_A =25°C.

The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

■ NMOS Typical Electrical and Thermal Characteristics Diagrams

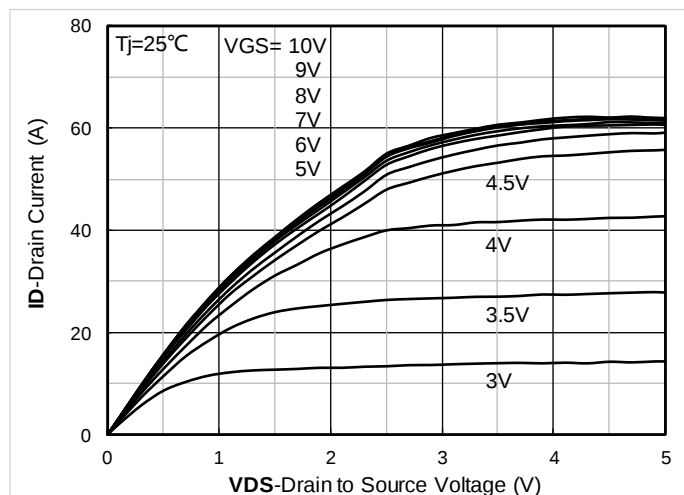


Figure 1. Output Characteristics

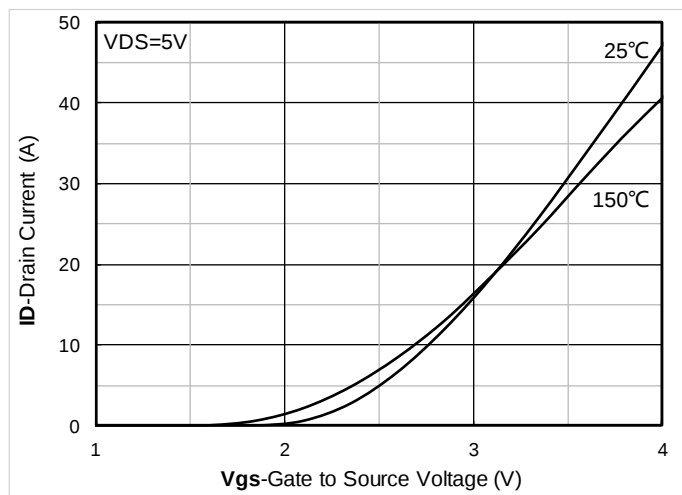


Figure 2. Transfer Characteristics

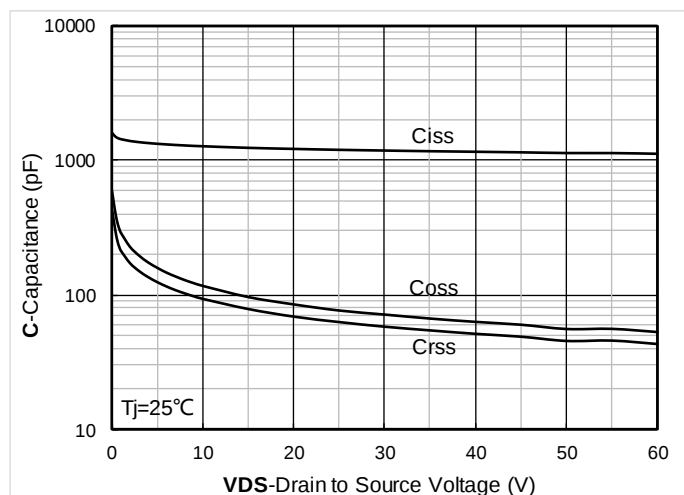


Figure 3. Capacitance Characteristics

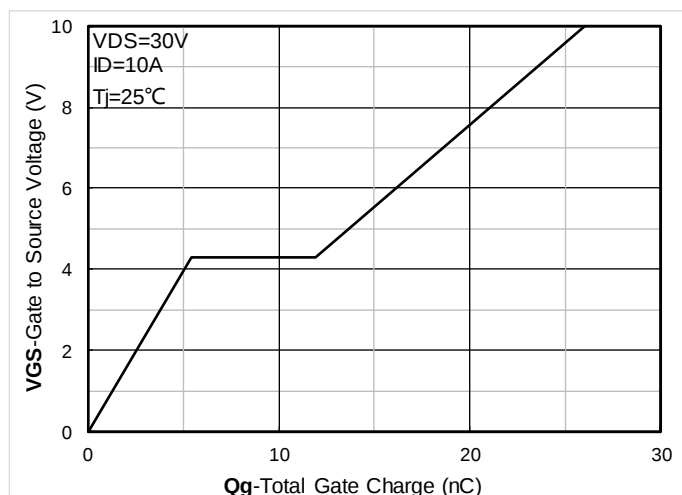


Figure 4. Gate Charge

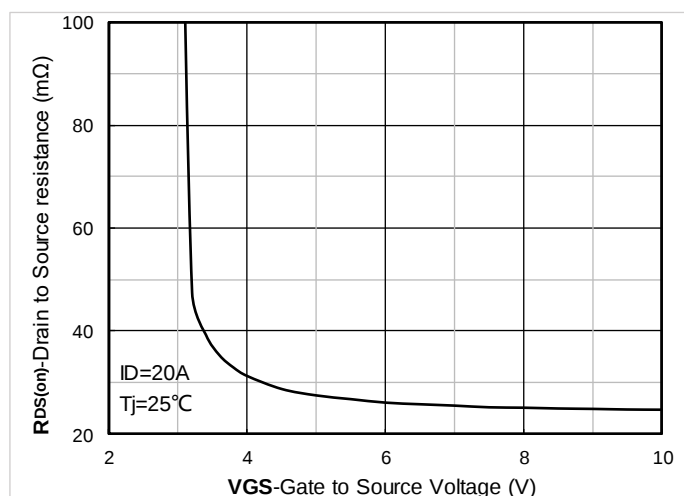


Figure 5. On-Resistance vs Gate to Source Voltage

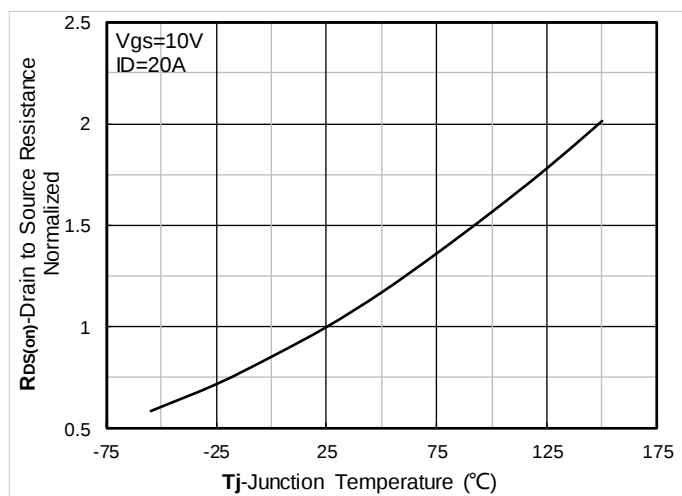


Figure 6. Normalized On-Resistance

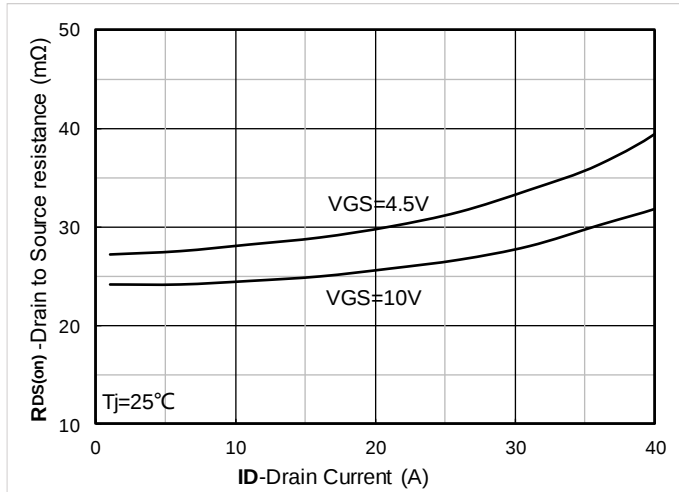


Figure 7. $R_{DS(on)}$ VS Drain Current

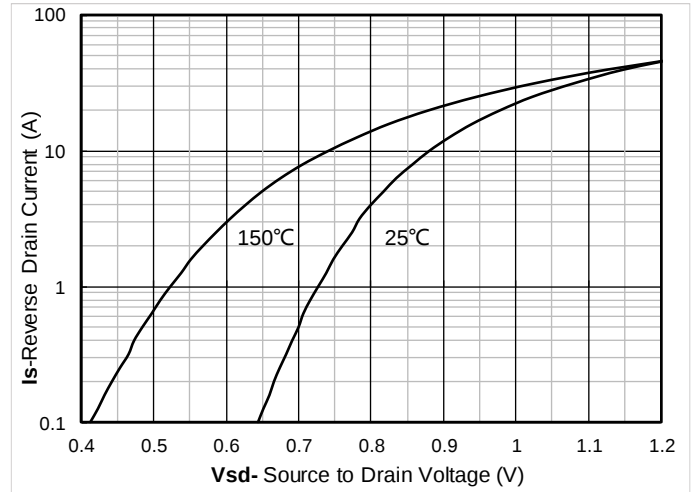


Figure 8. Forward characteristics of reverse diode

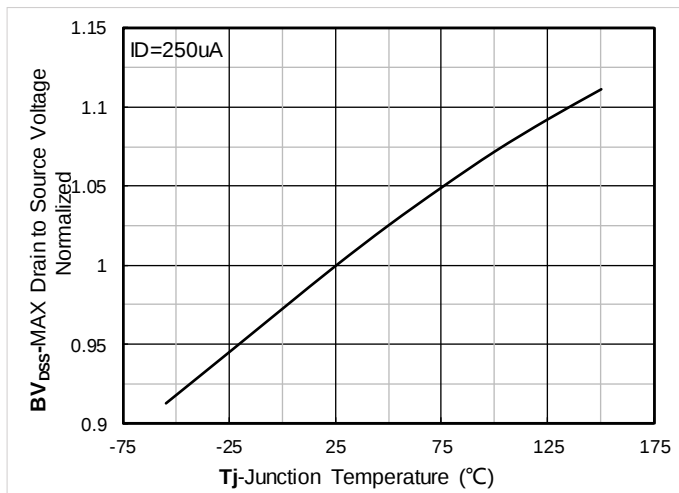


Figure 9. Normalized breakdown voltage

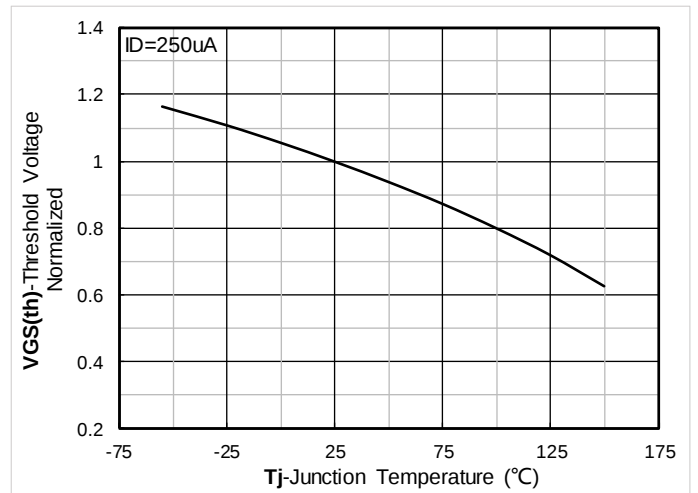


Figure 10. Normalized Threshold voltage

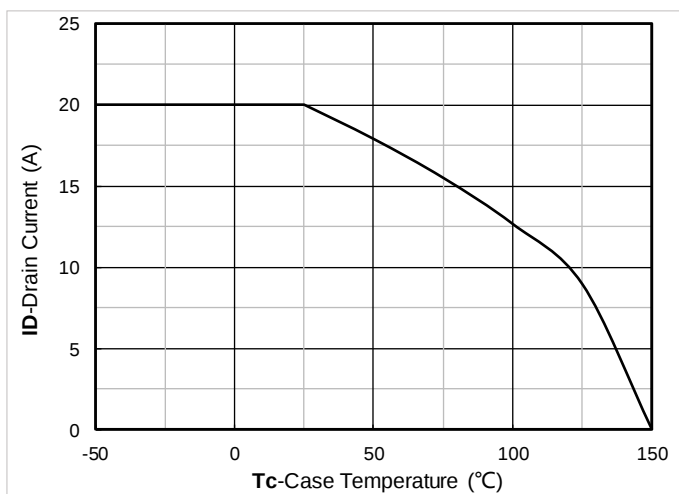


Figure 11. Current dissipation

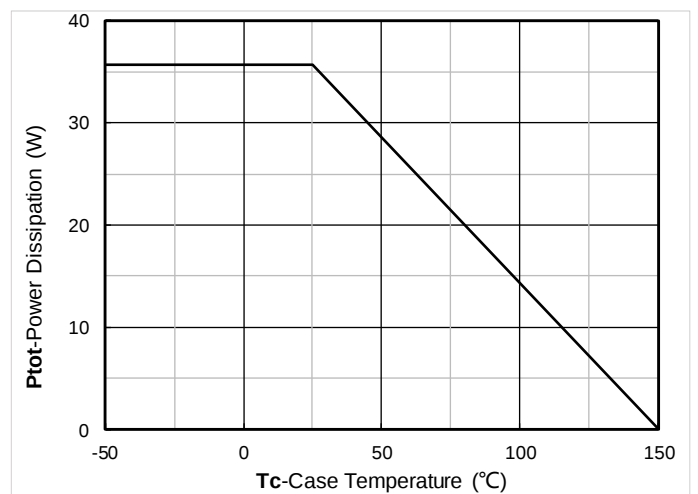


Figure 12. Power dissipation

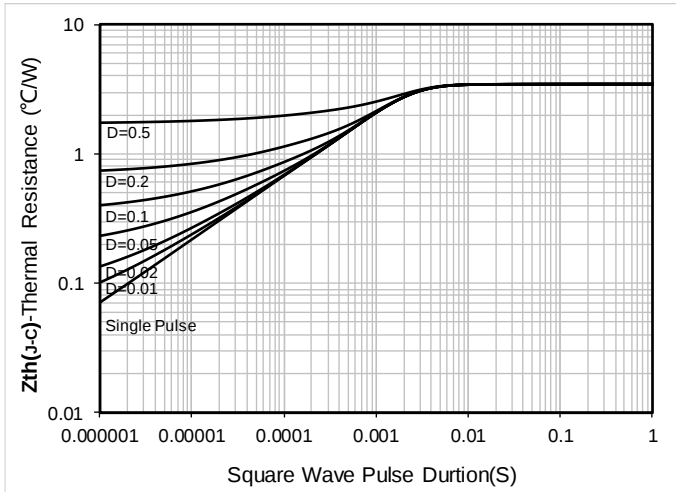


Figure 13. Maximum Transient Thermal Impedance

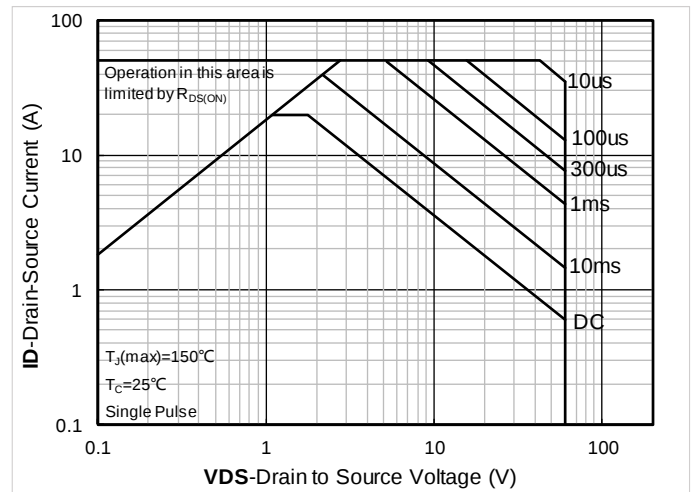


Figure 14. Safe Operation Area

PMOS Typical Electrical and Thermal Characteristics Diagrams

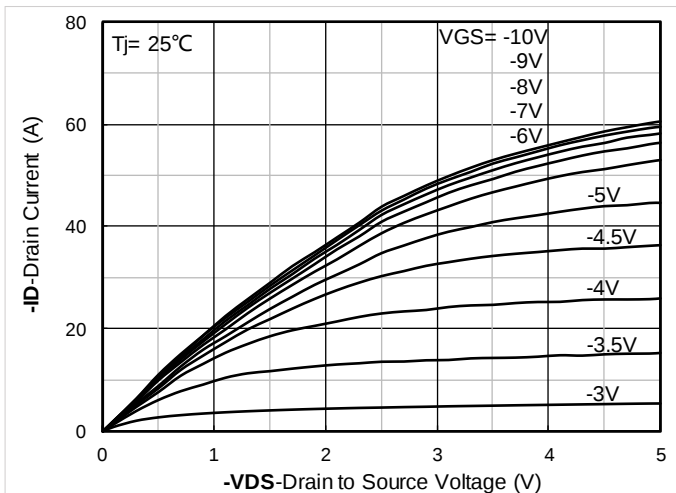


Figure 1. Output Characteristics

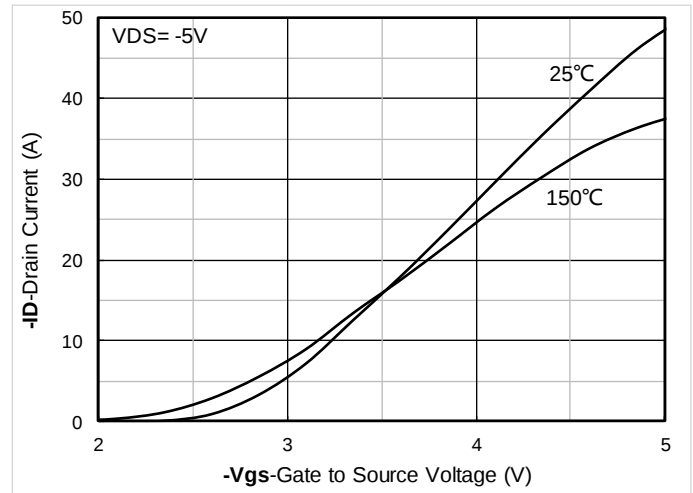


Figure 2. Transfer Characteristics

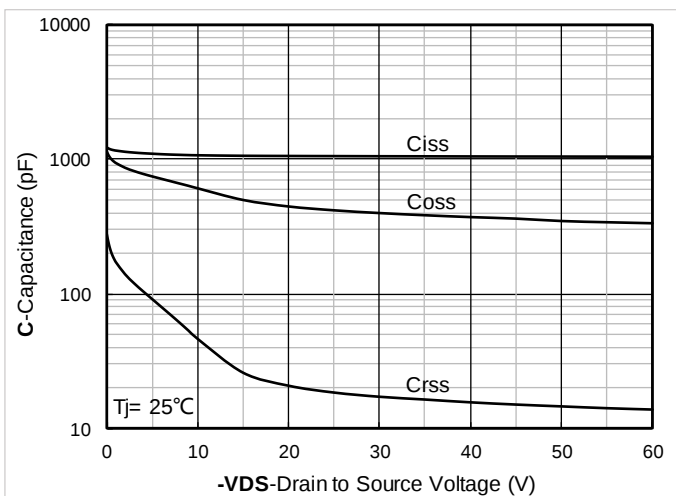


Figure 3. Capacitance Characteristics

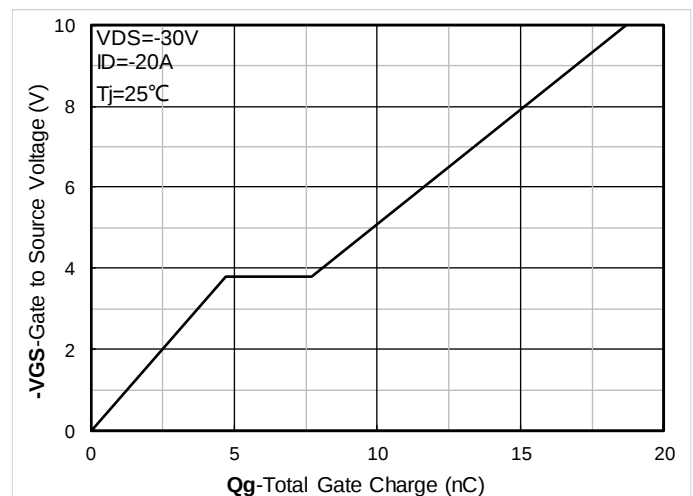


Figure 4. Gate Charge

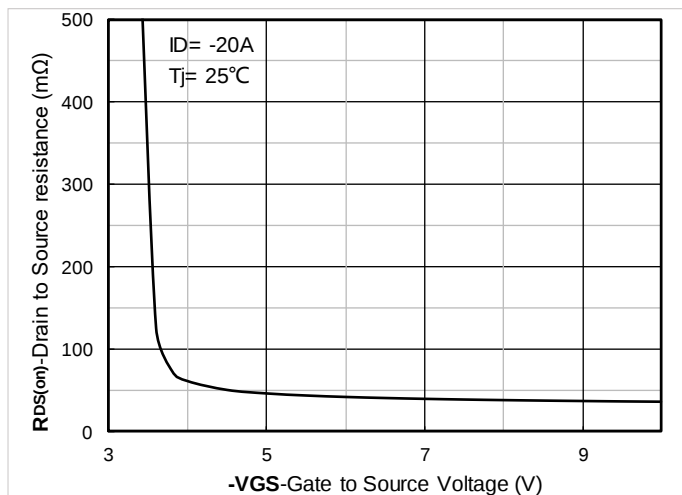


Figure 5. On-Resistance vs Gate to Source Voltage

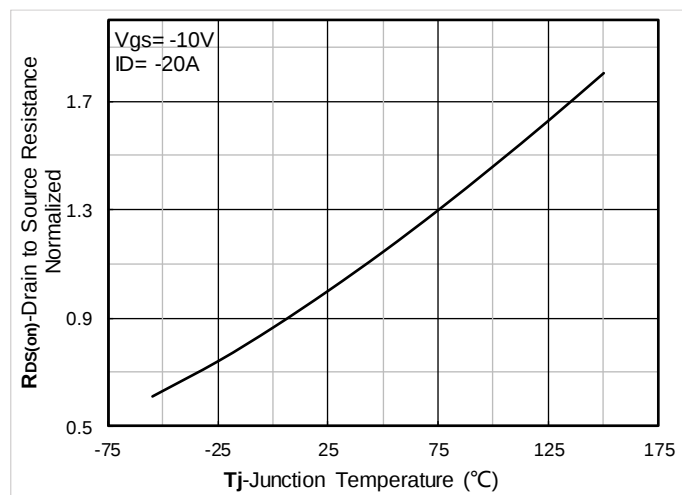


Figure 6. Normalized On-Resistance

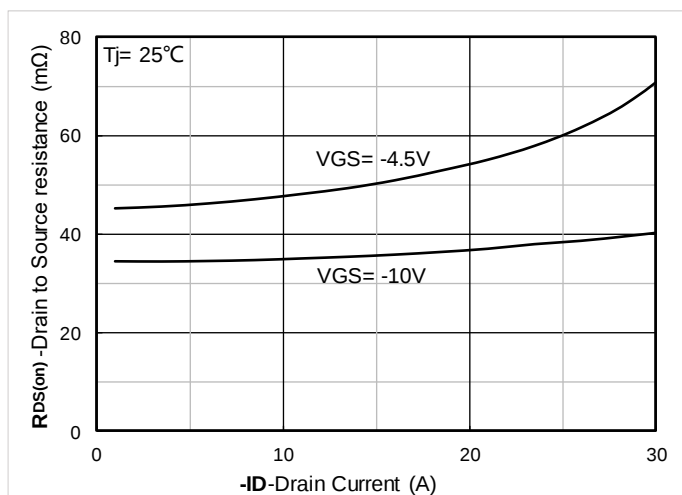


Figure 7. $R_{DS(on)}$ VS Drain Current

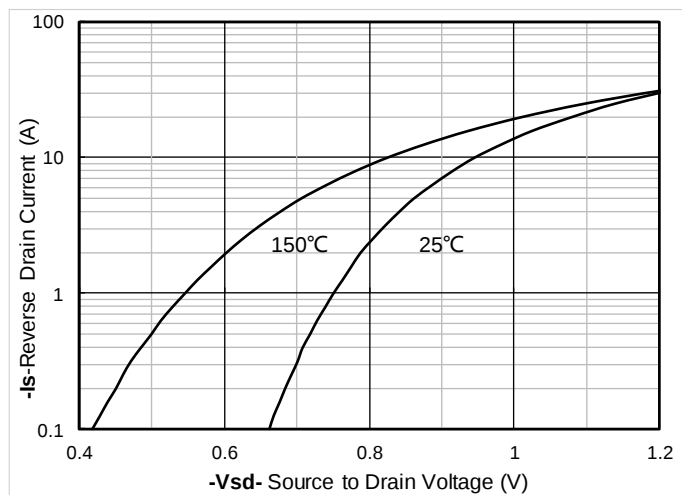


Figure 8. Forward characteristics of reverse diode

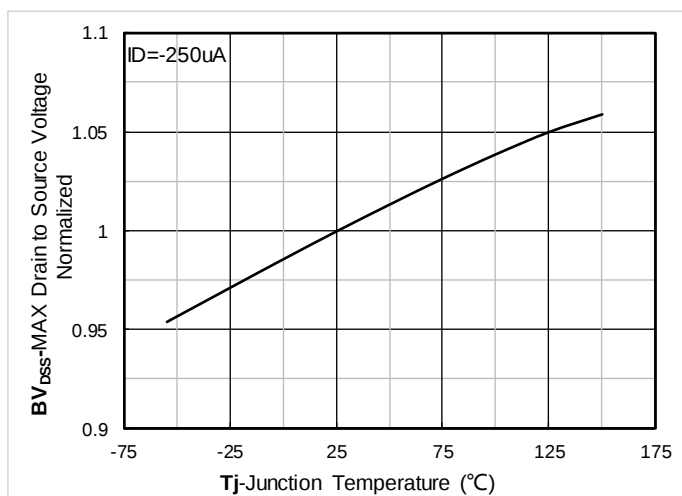


Figure 9. Normalized breakdown voltage

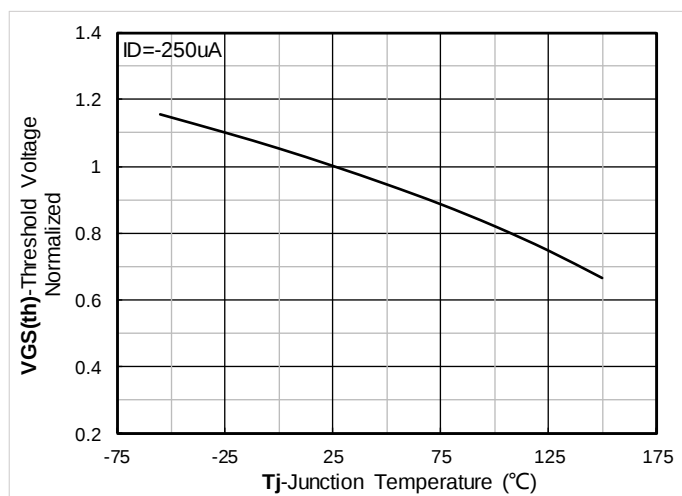


Figure 10. Normalized Threshold voltage

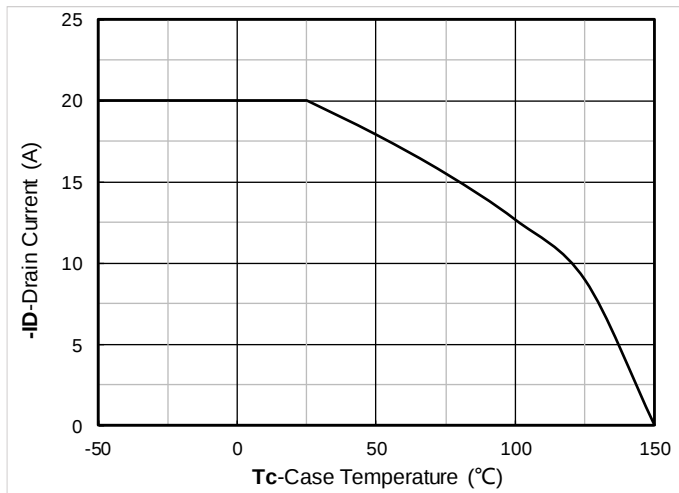


Figure 11. Current dissipation

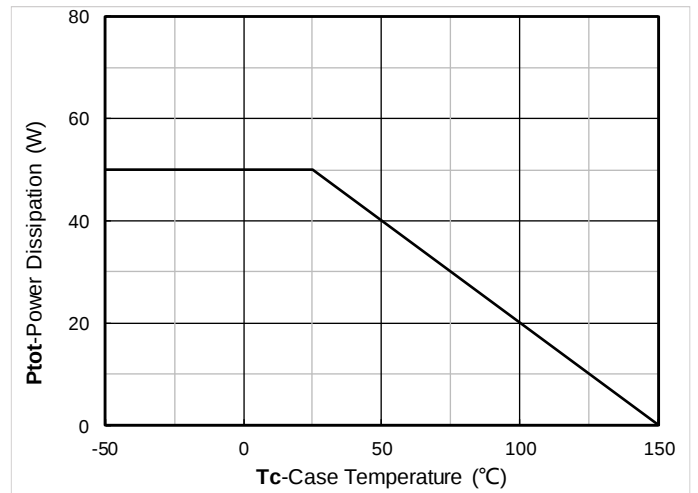


Figure 12. Power dissipation

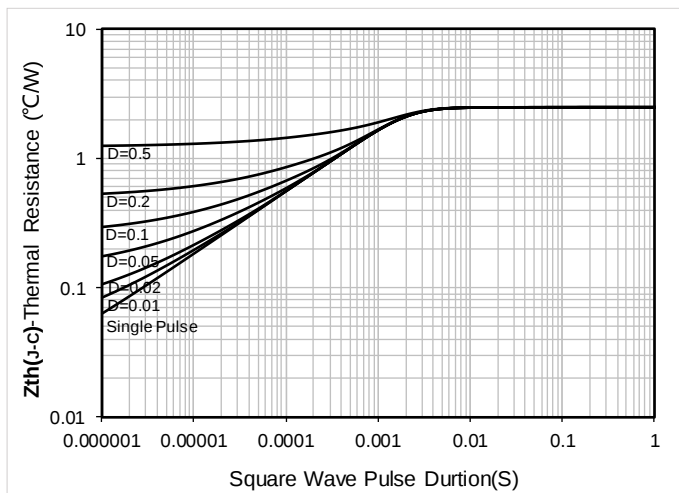


Figure 13. Maximum Transient Thermal Impedance

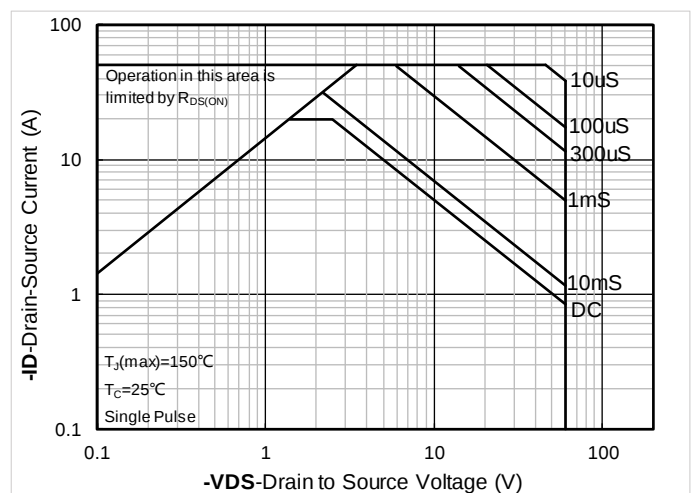
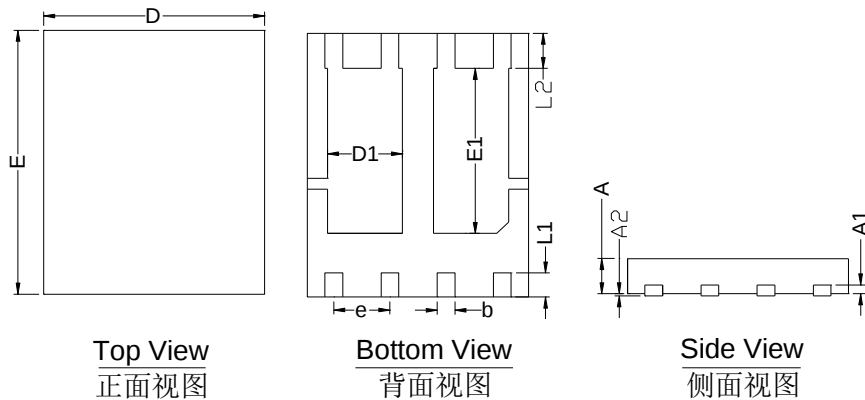


Figure 14. Safe Operation Area

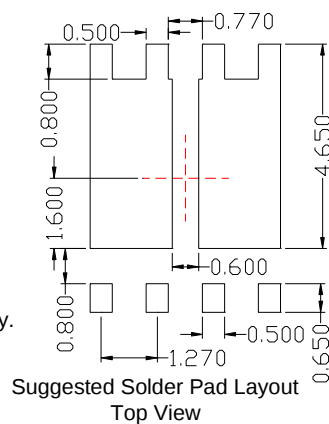
■ DFN5060-8L Package information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
D	4.90	5.00	5.10
E	5.90	6.00	6.10
A	0.70	0.80	0.90
A1	0.20 BSC		
A2			0.10
D1	1.60	1.70	1.80
E1	3.65	3.75	3.85
L1	0.45	0.55	0.65
L2	0.80 BSC		
b	0.30	0.40	0.50
e	1.27 BSC		

Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.10\text{mm}$.
3. The pad layout is for reference purposes only.



Suggested Solder Pad Layout
Top View

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