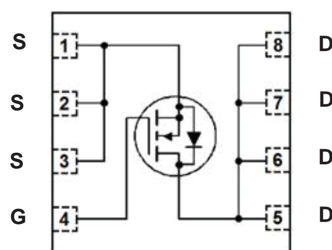
N-Channel MOSFET

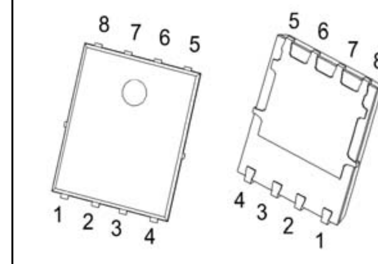
2KK6004DFN

■ Features

- V_{DS} (V) = 200 V
- I_{DMAX} (at V_{GS} = 10 V) = 20.2 A
- $R_{DS(ON)}$ (at V_{GS} = 10 V) < 50.5 mΩ
- $R_{DS(ON)}$ (at V_{GS} = 7.5 V) < 53.5 mΩ



DFN5x6-8(PDFNWB5x6-8L)



■ Absolute Maximum Ratings (T_A = 25℃ unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	200	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	20.2	A
	T_C = 70 °C		16.1	
	T_A = 25 °C		6.2 [b, c]	
	T_A = 70 °C		5.0 [b, c]	
Pulsed Drain Current (t = 100 μs)		I_{DM}	50	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	24	
	T_A = 25 °C		4.5 [b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	20	
Single Pulse Avalanche Energy		E_{AS}	20	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	52	W
	T_C = 70 °C		33	
	T_A = 25 °C		5 [b, c]	
	T_A = 70 °C		3.2 [b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +150	°C
Soldering Recommendations (Peak temperature) [d, e]			260	

■ Thermal resistance ratings

PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum Junction-to-Ambient [b, f]	t ≤10 s	R_{thJA}	20	25	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.9	2.4	

Notes

a. Package limited.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. This is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
e. Rework conditions: manual soldering with a solderin g iron is not recommended for leadless components.
f. Maximum under steady stat e conditions is 65 °C/W.
g. T_C = 25 °C.

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■ Electrical Characteristics (T_J = 25℃ unless othewise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	200	-	-	V
V_{DS} Temperature Coefficient	$\triangle V_{DS}/T_J$	I_D = 250 μA	-	165	-	mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}/T_J$		-	-6.8	-	
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2	-	4	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 70 °C	-	-	10	
On-State Drain Current [a]	$I_{D(on)}$	$V_{DS} \geqslant$ 5 V, V_{GS} = 10 V	30	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10 A	-	0.042	0.0505	Ω
		V_{GS} = 7.5 V, I_D = 10 A	-	0.043	0.0535	
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 10 A	-	35	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{DS} = 100 V, V_{GS} = 0 V, f = 1 MHz	-	1450	-	pF
Output Capacitance	C_{oss}		-	116	-	
Reverse Transfer Capacitance	C_{rss}		-	9.0	-	
Total Gate Charge	Q_g	V_{DS} = 100 V, V_{GS} = 10 V, I_D = 10 A	-	23.7	36	nC
		V_{DS} = 100 V, V_{GS} = 7.5 V, I_D = 10 A	-	18.3	28	
Gate-Source Charge	Q_{gs}		-	6.3	-	
Gate-Drain Charge	Q_{gd}		-	6.0	-	
Output Charge	Q_{oss}	V_{DS} = 100 V, V_{GS} = 0 V	-	40.5	61	
Gate Resistance	R_g	f = 1 MHz	0.2	1.0	1.8	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 100 V, R_L = 10 Ω $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	10	20	ns
Rise Time	t_r		-	18	36	
Turn-Off Delay Time	$t_{d(off)}$		-	17	34	
Fall Time	t_f		-	8	16	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 100 V, R_L = 10 Ω $I_D \cong$ 10 A, V_{GEN} = 7.5 V, R_g = 1 Ω	-	13	26	
Rise Time	t_r		-	29	58	
Turn-Off Delay Time	$t_{d(off)}$		-	16	32	
Fall Time	t_f		-	8	16	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C	-	-	24	A
Pulse Diode Forward Current (t = 100 μs)	I_{SM}		-	-	50	
Body Diode Voltage	V_{SD}	I_S = 5 A	-	0.81	1.1	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 10 A, dI/dt = 100 A/μs, T_J = 25 °C	-	165	330	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	570	1140	nC
Reverse Recovery Fall Time	t_a		-	70	-	ns
Reverse Recovery Rise Time	t_b		-	95	-	

Notes

a. Pulse test; pulse width ⩽ 300 μs, duty cycle ⩽ 2 %.

b. Guaranteed by design, not subj ect to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" ma y cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those in dicated in the operational sectio ns of the specifications is not implied. Exposure to absolute maximum rating conditions for extended pe riods may affect device reliability.

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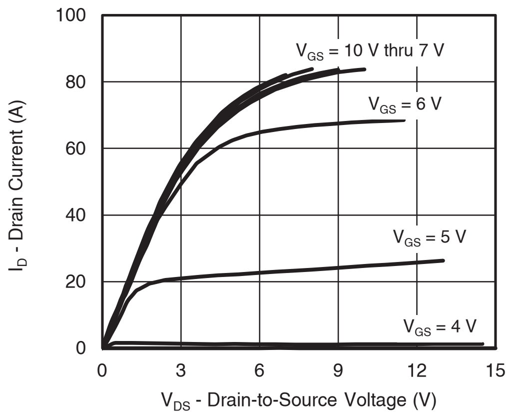
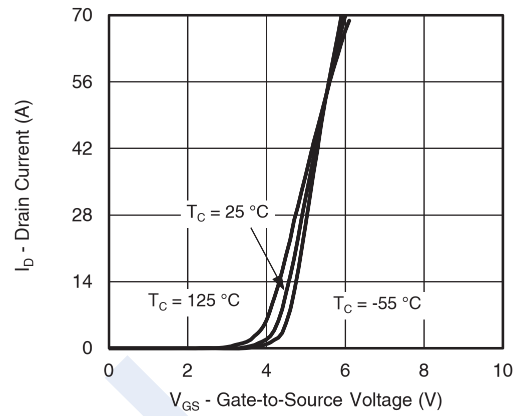
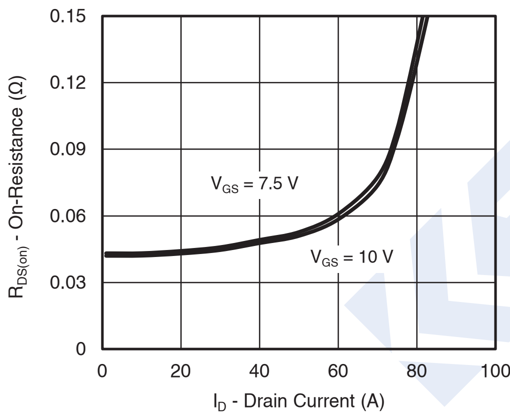
■ Typical Characterisitics TJ = 25℃ unless othewise specified



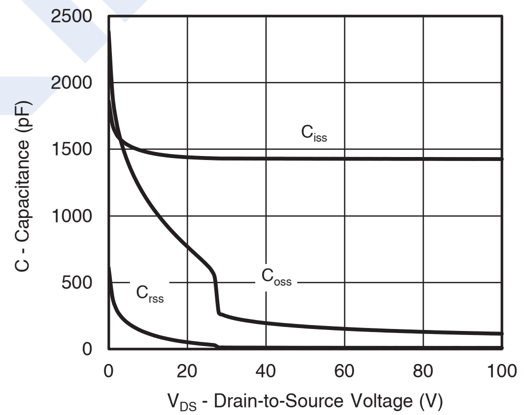
Output Characteristics



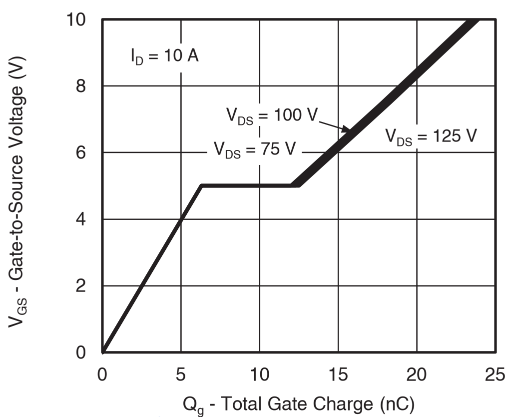
Transfer Characteristics



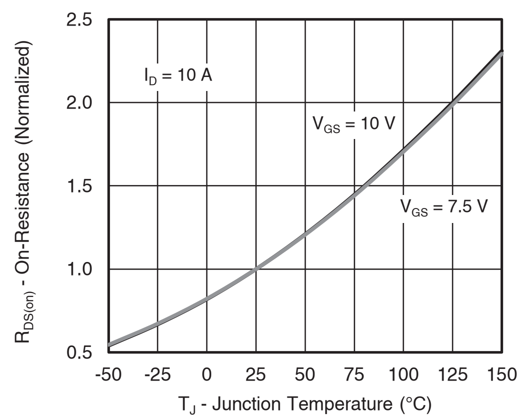
On-Resistance vs. Drain Current



Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

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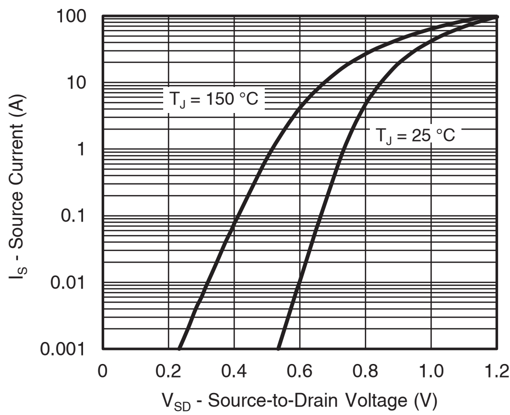
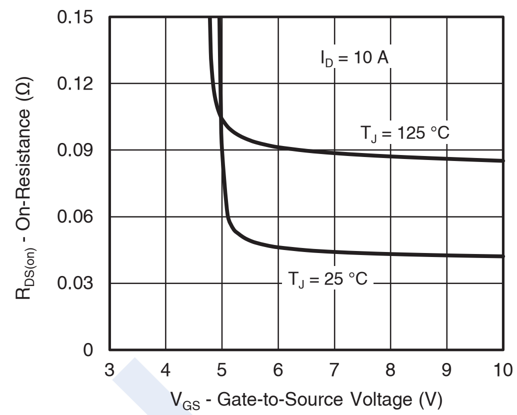
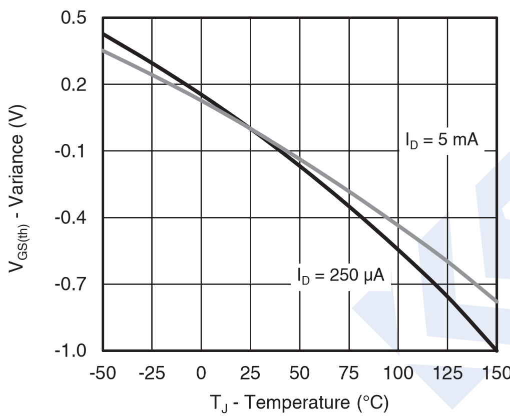


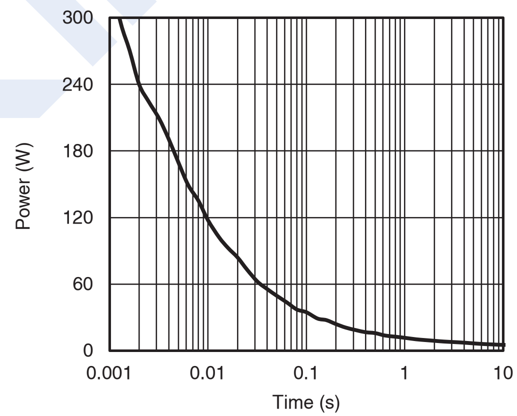
Source-Drain Diode Forward Voltage



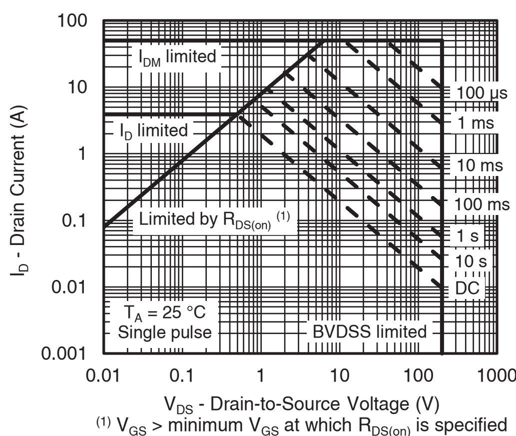
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Safe Operating Area, Junction-to-Ambient

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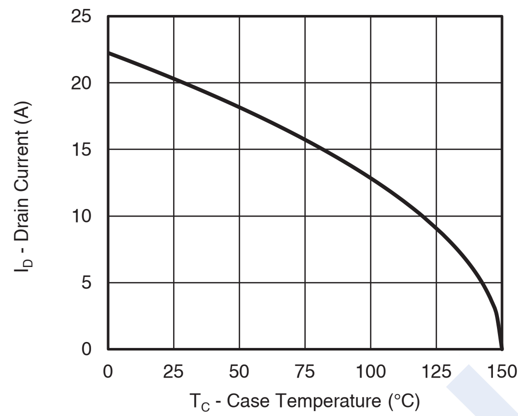
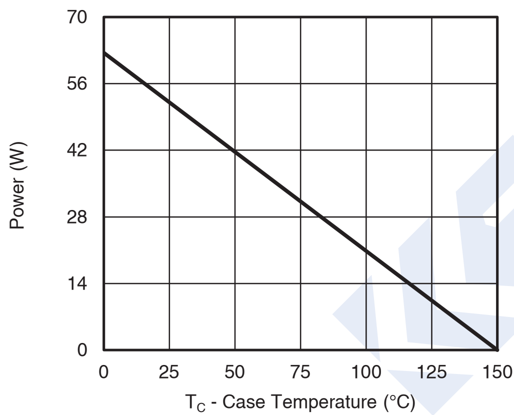
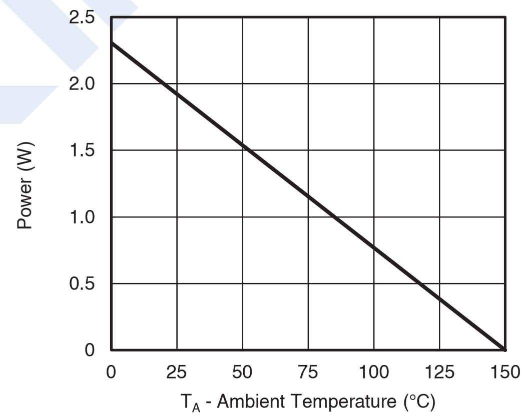


Current Derating [a]



Power, Junction-to-Case



Power, Junction-to-Ambient

Note

a. The power dissipation P_D is based on T_J (max.) = 150 °C, using junction-to- case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the cu rrent rating, when this rating falls below the package limit.

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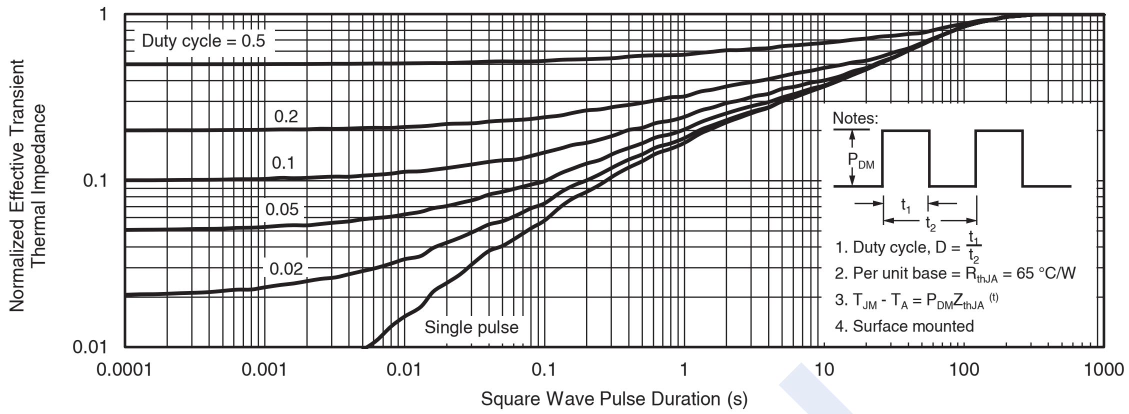
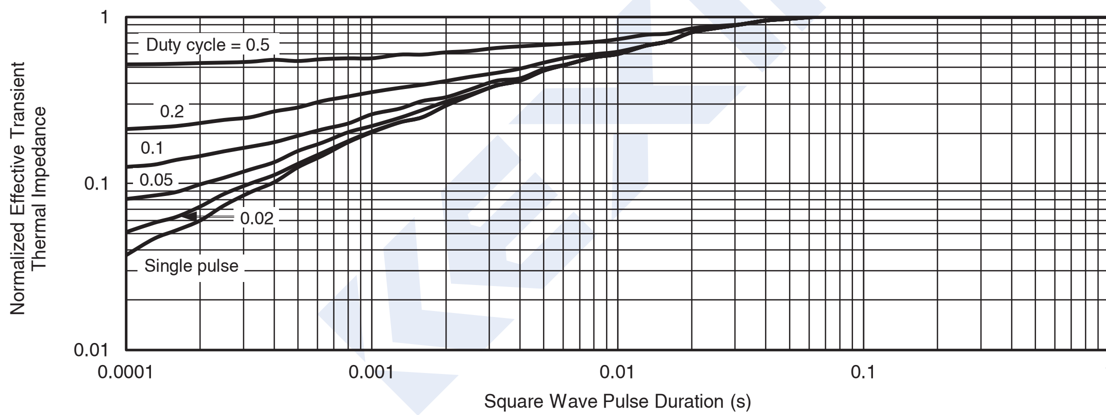


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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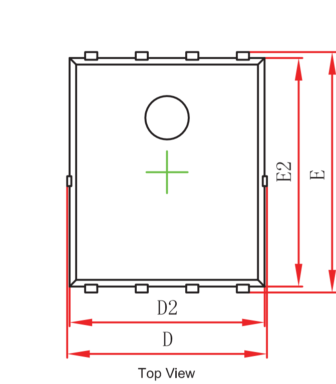
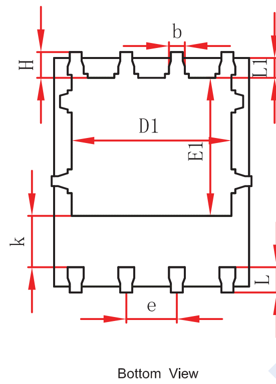
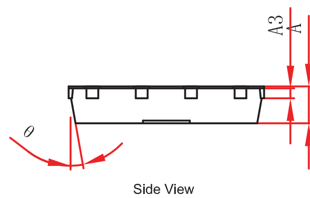
■ DFN5x6-8(PDFNWB5x6-8L) Package Outline Dimensions



Top View



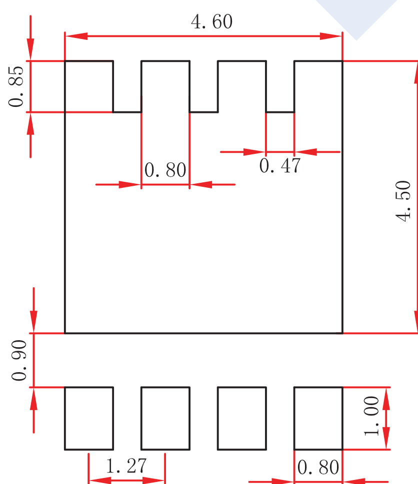
Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

■ DFN5x6-8(PDFNWB5x6-8L) Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.