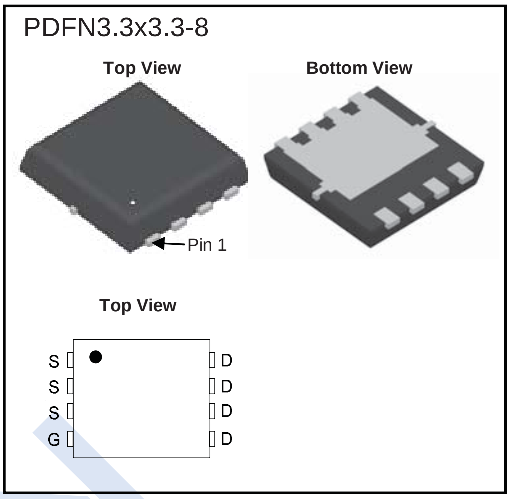
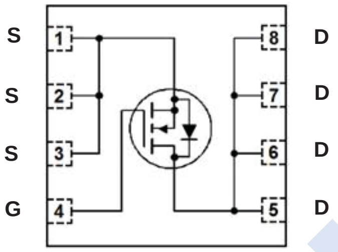
N-Channel MOSFET

2KK6003DFN



Features

- V_{DS} (V) = 30 V
- I_{DMAX} = 40 A
- $R_{DS(ON)}$ (at V_{GS} = 10 V) = 8.6 mΩ
- $R_{DS(ON)}$ (at V_{GS} = 4.5 V) = 10.7 mΩ
- High Power and current handing capability



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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	$40^{a, e}$	A
	T_C = 70 °C		35^{e}	
	T_A = 25 °C		$19^{b, c}$	
	T_A = 70 °C		$16.8^{b, c}$	
Pulsed Drain Current		I_{DM}	120	
Avalanche Current Pulse	L = 0.1 mH	I_{AS}	26	
Single Pulse Avalanche Energy		E_{AS}	53.2	mJ
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	$40^{a, e}$	A
	T_A = 25 °C		$21^{b, c}$	
Maximum Power Dissipation	T_C = 25 °C	P_D	31.2	W
	T_C = 70 °C		20	
	T_A = 25 °C		$3.55^{b, c}$	
	T_A = 70 °C		$2.13^{b, c}$	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

Thermal Resistance Ratings

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[b, d]	t ≤10 s	R_{thJA}	31	44	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	3	4	

Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. Maximum under steady state conditions is 90 °C/W.
e. Calculated based on maximum junction temperature. Package limitation current is 10 A.

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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	30			V
V_{DS} Temperature Coefficient	$\triangle V_{DS}/T_J$	I_D = 250 μA		35		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}/T_J$			- 5.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1		3	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} = 30 V, V_{GS} = 0 V			1	μA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geqslant 5$ V, V_{GS} = 10 V	45			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 12 A		0.0086	0.0095	Ω
		V_{GS} = 4.5 V, I_D = 9 A		0.0107	0.012	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 12 A		100		S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{DS}= 12.5 V, V_{GS} = 0 V, f = 1 MHz		584		pF
Output Capacitance	C_{oss}			403		
Reverse Transfer Capacitance	C_{rss}			271		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 12 A		71		nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 9 A		61.5		
Gate-Source Charge	Q_{gs}			34		
Gate-Drain Charge	Q_{gd}			29		
Gate Resistance	R_g	f = 1 MHz		1.4	2.1	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 0.555 Ω $I_D \cong$ 7 A, V_{GEN} = 10 V, R_g = 1 Ω		18	27	ns
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			70	105	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 0.625 Ω $I_D \cong$ 4 A, V_{GEN} = 4.5 V, R_g = 1 Ω		55	83	
Rise Time	t_r			180	270	
Turn-Off Delay Time	$t_{d(off)}$			55	83	
Fall Time	t_f			12	18	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			40	A
Pulse Diode Forward Current[a]	I_{SM}				120	
Body Diode Voltage	V_{SD}	I_S = 12 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 10 A, di/dt = 100 A/μs, T_J = 25 °C		52	78	ns
Body Diode Reverse Recovery Charge	Q_{rr}			70.2	105	nC
Reverse Recovery Fall Time	t_a			27		ns
Reverse Recovery Rise Time	t_b			25		

Notes:
a. Pulse test; pulse width ⩽300 μs, duty cycle ⩽2 %.
b. Guaranteed by design, not subject to production testing.

■ Marking

Marking	K6003 KC***

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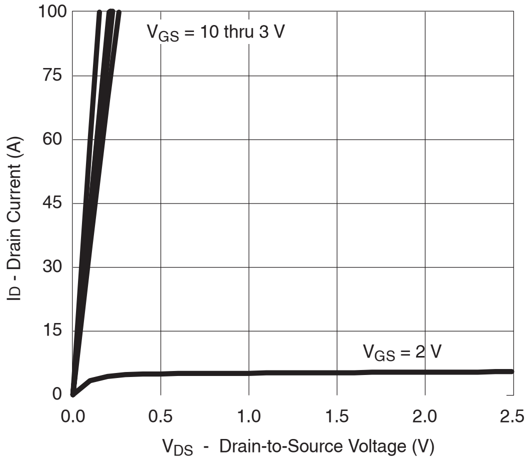
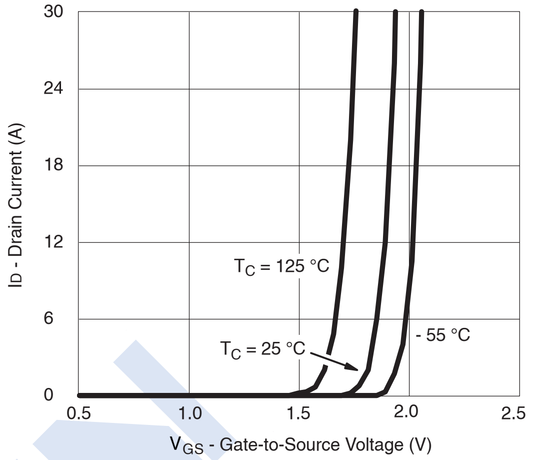
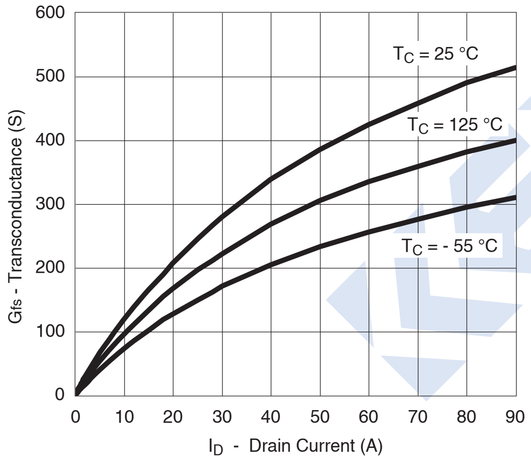
■ Typical Characterisitics (25 °C, unless otherwise noted)



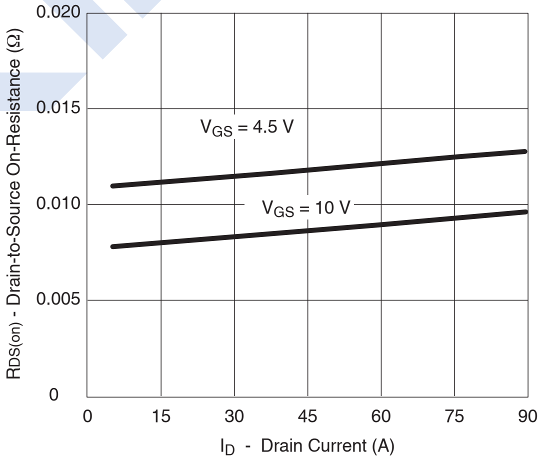
Output Characteristics



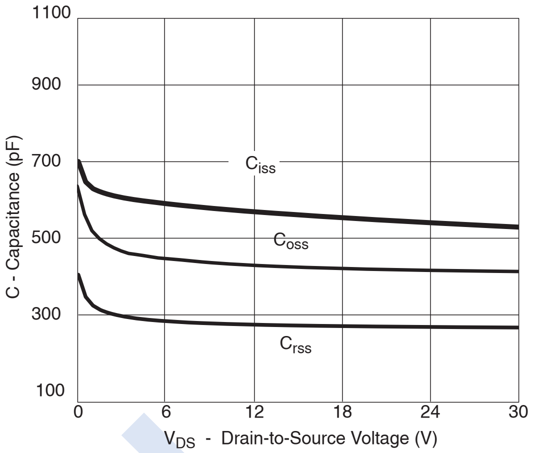
Transfer Characteristics



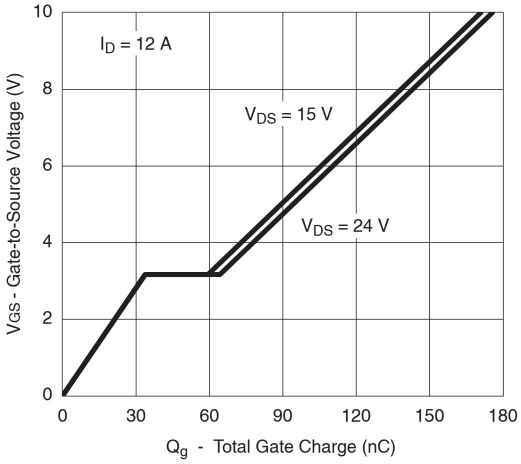
Transconductance



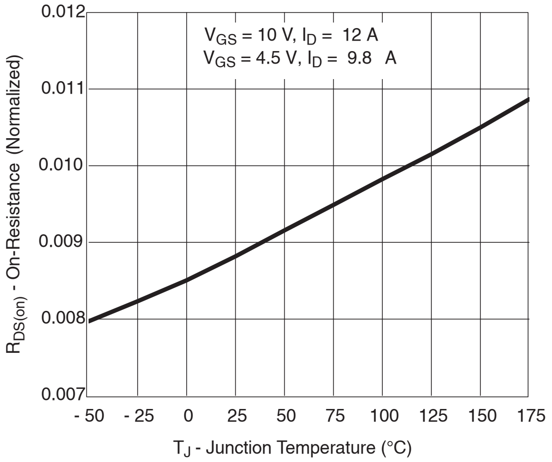
$R_{DS(on)}$ vs. Drain Current



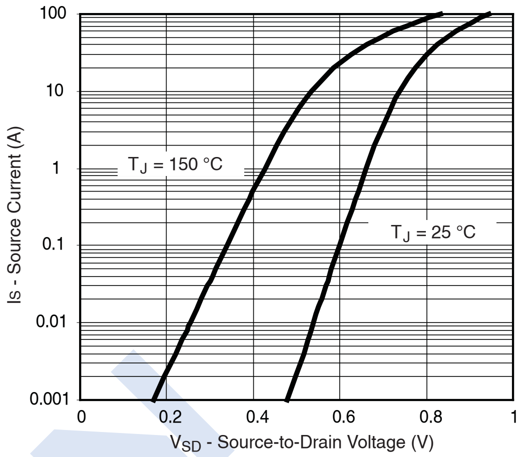
Capacitan ce



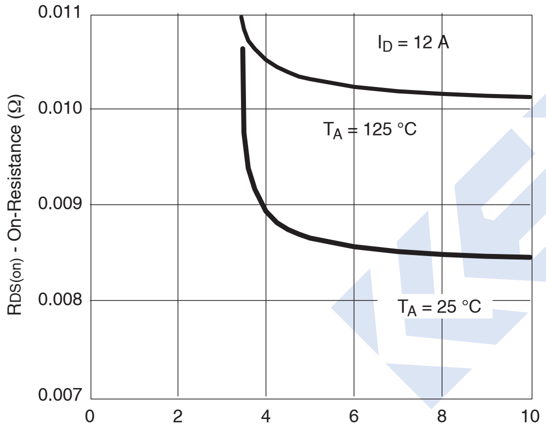
Gate Charge



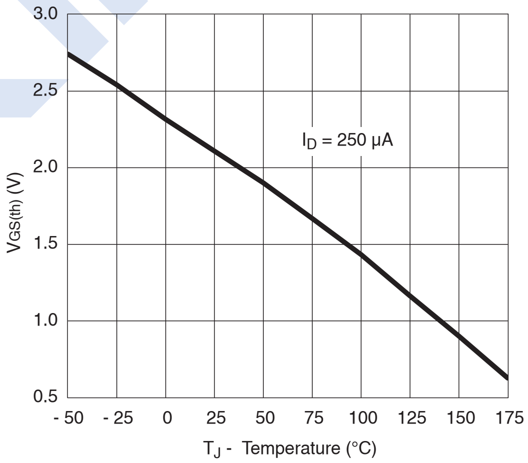
On-Resistance vs. Junction Temperatur e



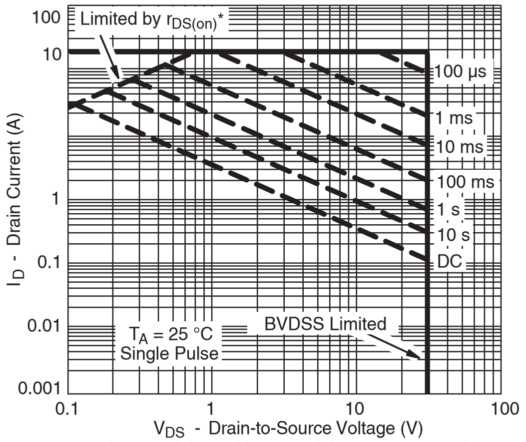
Forward Diode Voltage vs. Temperature



$R_{DS(on)}$ vs. V_{GS} vs. Temperature



Thresh old Voltage



*V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

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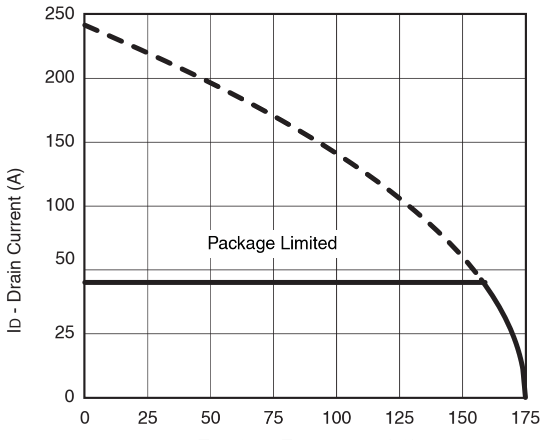
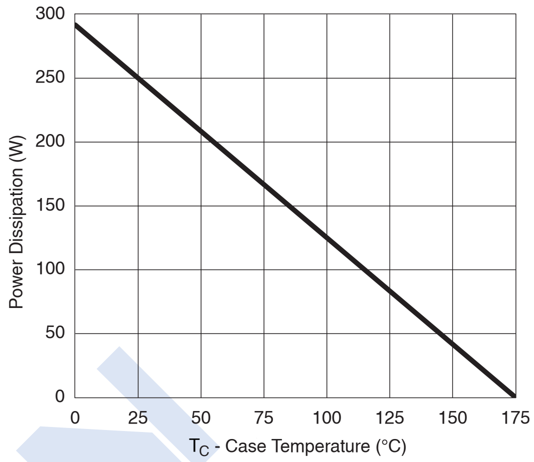
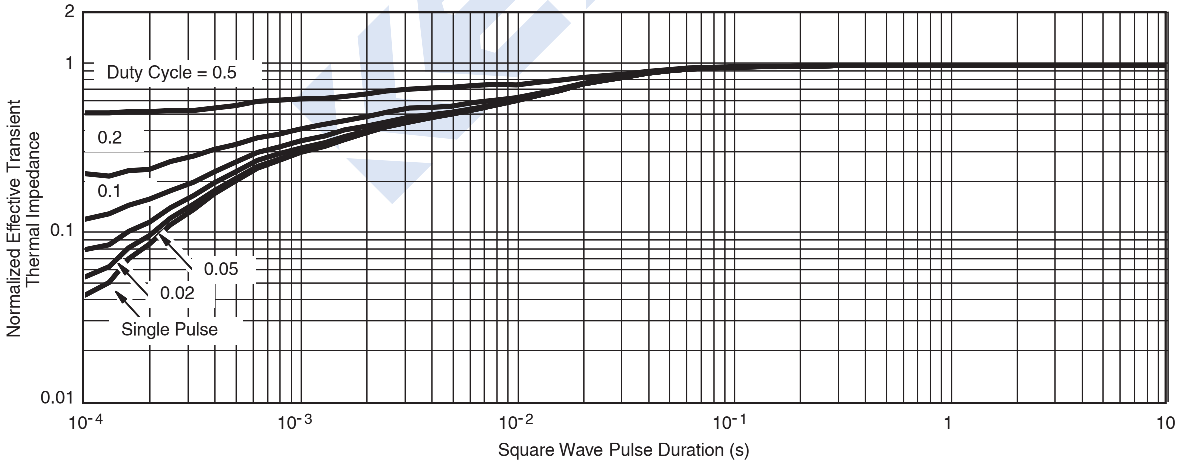


Current Derating*



Power Derating

* The power dissipation P_D is based on $T_{J(max)}$ = 175 °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 current rating, when this rating falls below the package limit.



Normalized Thermal Transient Impedance, Junction-to-Case

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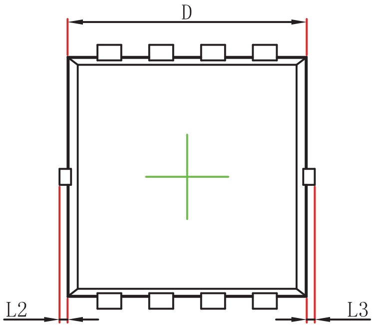
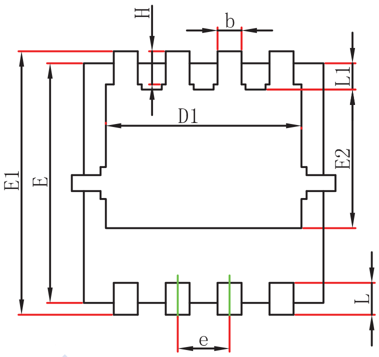
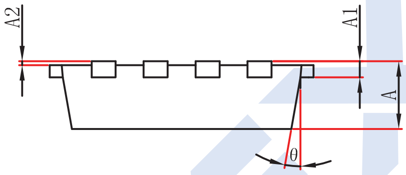
■ PDFN3.3x3.3-8 Package Outline Dimensions



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.102
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°