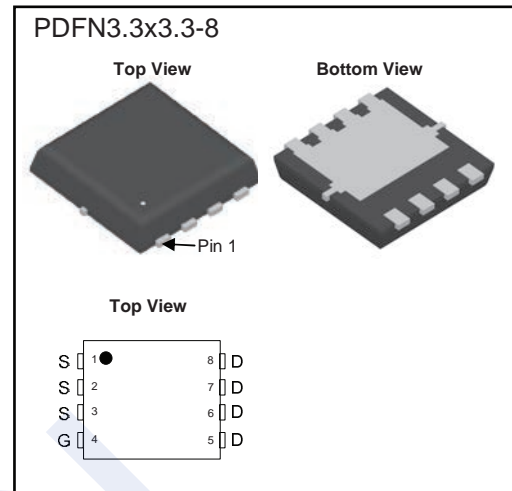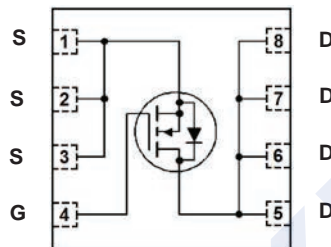# N-Channel MOSFET

2KK5778DFN

■ Features

- $V_{DS\,(V)}$ = 60 V

- I_D = 41 A @ V_{GS}=10V

- $R_{DS(ON)}$ = 7.5mΩ (typ.) @ V_{GS}=10V

- $R_{DS(ON)}$ = 9.4mΩ (typ.) @ V_{GS}=4.5V

PDFN3.3x3.3-8

Top View   Bottom View

← Pin 1

Top View

S 1	8 D
S 2	7 D
S 3	6 D
G 4	5 D

S	1	8	D
S	2	7	D
S	3	6	D
G	4	5	D

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

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (1)	Tc=25℃	I_D	41	A
	Tc=100℃		26	
Pulsed Drain Current (2)		I_{DM}	147	
Avalanche Current, Single pulse (3)		I_{AS}	26	
Avalanche Energy, Single pulse (3)		E_{AS}	34	mJ
Power Dissipation (4)	Tc=25℃	P_D	28	W
	Tc=100℃		11.1	
Thermal Resistance.Junction- to-Case		$R_{\theta JC}$	4.5	℃/W
Thermal Resistance.Junction- to-Ambient		$R_{\theta JA}$	62	
Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{stg}	-55 to 150	

Notes 1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.

2. This single-pulse measurement was taken under T_{J_Max} = 150°C.

3. This single-pulse measurement was taken under the following condition (L =100μH, V_{GS} = 10V, V_{DS} = 30V) while its value is limited by T_{J_Max} = 150°C.

4. The power dissipation P_D is based on T_{J_Max}= 150°C.

N-Channel MOSFET

2KK5778DFN

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 250\ \mu A$, $V_{GS} = 0V$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 48\ V$, $V_{GS} = 0\ V$			1	μA
		$V_{DS} = 48\ V$, $V_{GS} = 0\ V$, $T_J = 55\ ℃$			5	
Gate to Source Leakage Current	I_{GSS}	$V_{DS} = 0\ V$, $V_{GS} = \pm20\ V$			±100	nA
Gate to Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	1.2		2.5	V
Static Drain-Source On-Resistance	$R_{DS(On)}$	$V_{GS} = 10\ V$, $I_D = 20\ A$		7.5	9.4	mΩ
		$V_{GS} = 4.5\ V$, $I_D = 15\ A$		9.4	12.2	
Forward Transconductance	g_{FS}	$V_{DS} = 5V$, $I_D = 20A$		85		S
Diode Forward Voltage	V_{SD}	$I_S = 1A$, $V_{GS} = 0V$			1	V
Diode Continuous Current	I_S				28	A
Dynamic Parameters (5)						
Input Capacitance	C_{iss}	$V_{GS} = 0\ V$, $V_{DS} = 30\ V$, $f = 1\ MHz$		1087		pF
Output Capacitance	C_{oss}			309		
Reverse Transfer Capacitance	C_{rss}			8.5		
Gate Resistance	R_g	$V_{GS} = 0\ V$, $V_{DS} = 0\ V$, $f = 1\ MHz$		1.6		Ω
Switching Parameters (5)						
Total Gate Charge (V_{GS}=10V)	Q_g	$V_{GS} = 10V$, $V_{DS} = 30\ V$, $I_{DS} = 20\ A$		16.6		nC
Total Gate Charge (V_{GS}=4.5V)				8.3		
Gate Source Charge	Q_{gs}			2.6		
Gate Drain Charge	Q_{gd}			2.7		
Turn-On DelayTime	$t_{d(on)}$	$V_{GS} = 10V$, $V_{DS} = 30V$ $R_L = 1.5Ω$, $R_{GEN} = 6Ω$		4.7		ns
Turn-On Rise Time	t_r			7.6		
Turn-Off DelayTime	$t_{d(off)}$			24		
Turn-Off Fall Time	t_f			8.9		
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 15\ A$, $dI/dt = 100\ A/\mu s$		26		
Body Diode Reverse Recovery Charge	Q_{rr}			13.4		nC

Note 5. This value is guaranteed by design hence it is not included in the production test.

■ Marking

2KK5778DFN	K5778 KC***

N-Channel MOSFET

2KK5778DFN

■ Typical Characterisitics & Thermal Characteristics
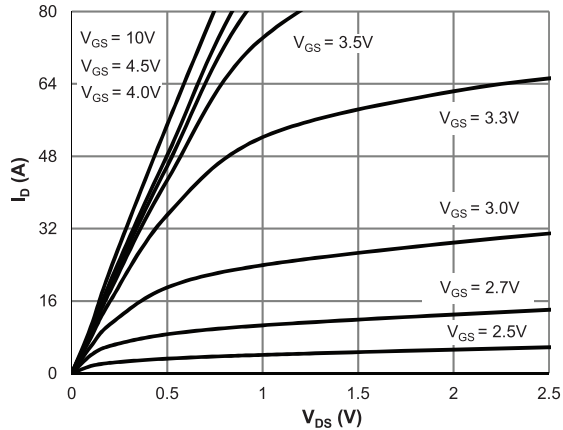

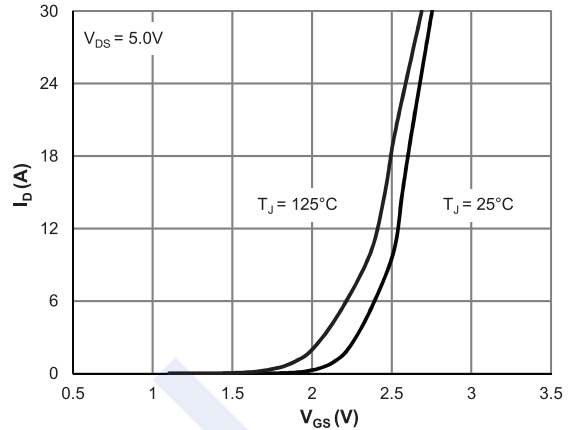**Figure 1: Saturation Characteristics**

Figure 2: Transfer Characteristics
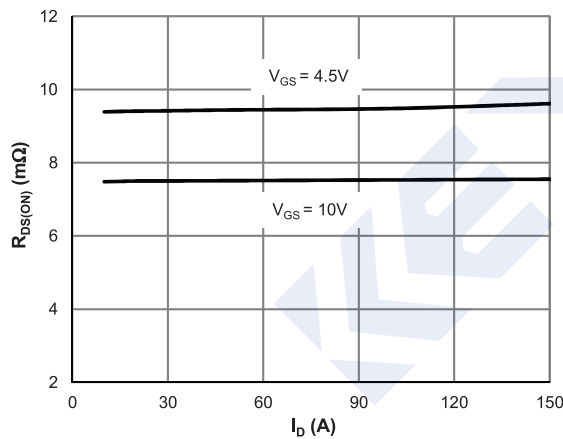

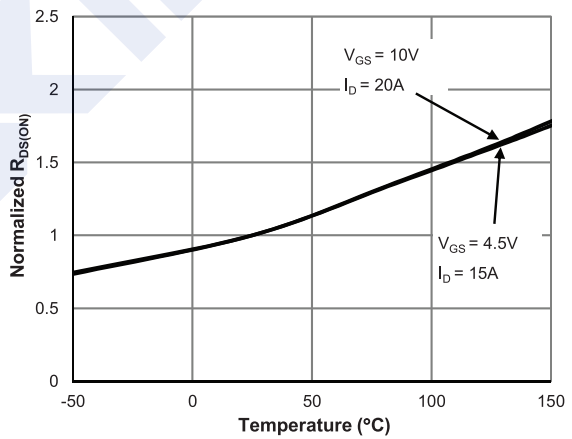**Figure 3: $R_{DS(ON)}$ vs. Drain Current**

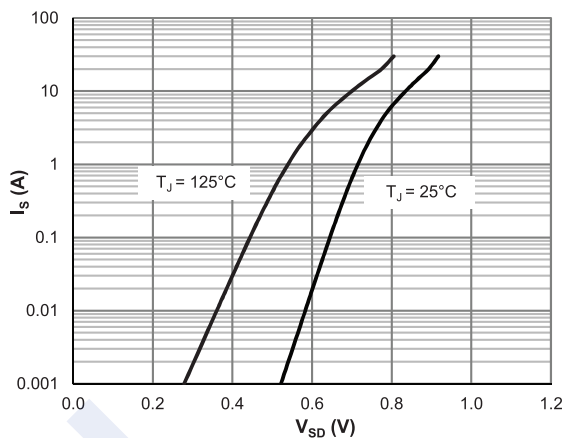**Figure 4: $R_{DS(ON)}$ vs. Junction Temperature**
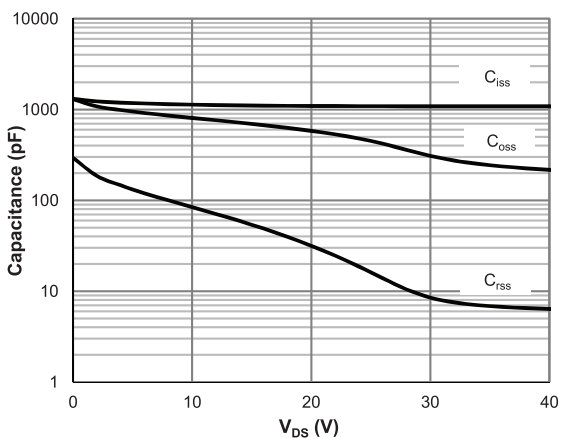

Figure 5: Body-Diode Characteristics

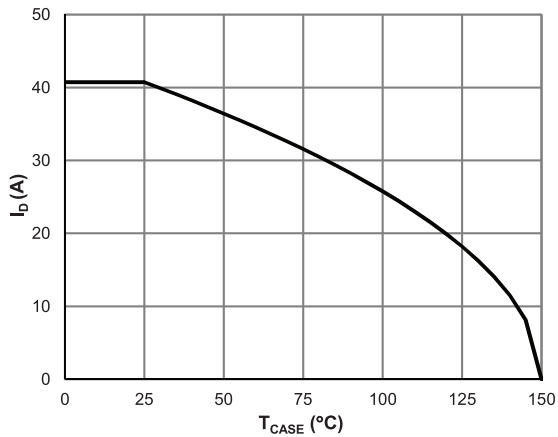**Figure 6: Capacitance Characteristics**

N-Channel MOSFET

2KK5778DFN

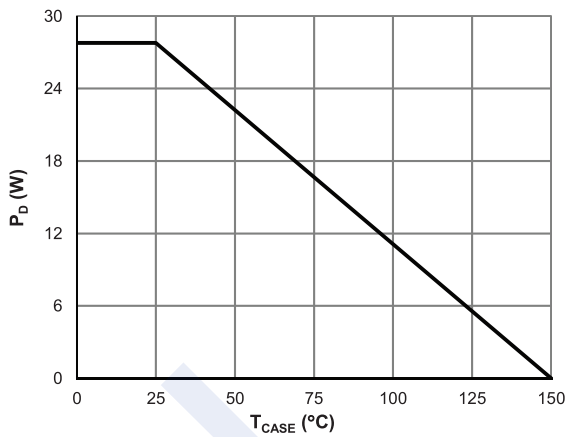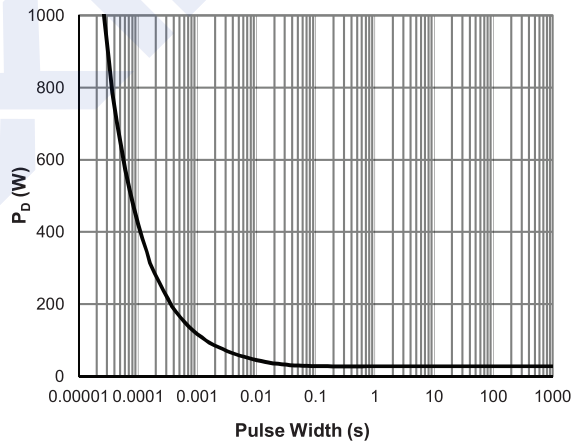**Figure 7: Current De-rating**

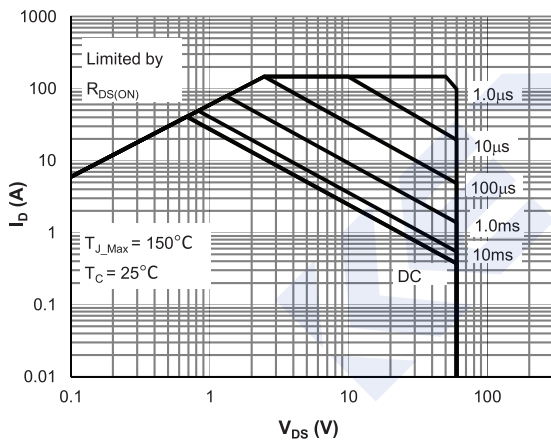**Figure 8: Power De-rating**

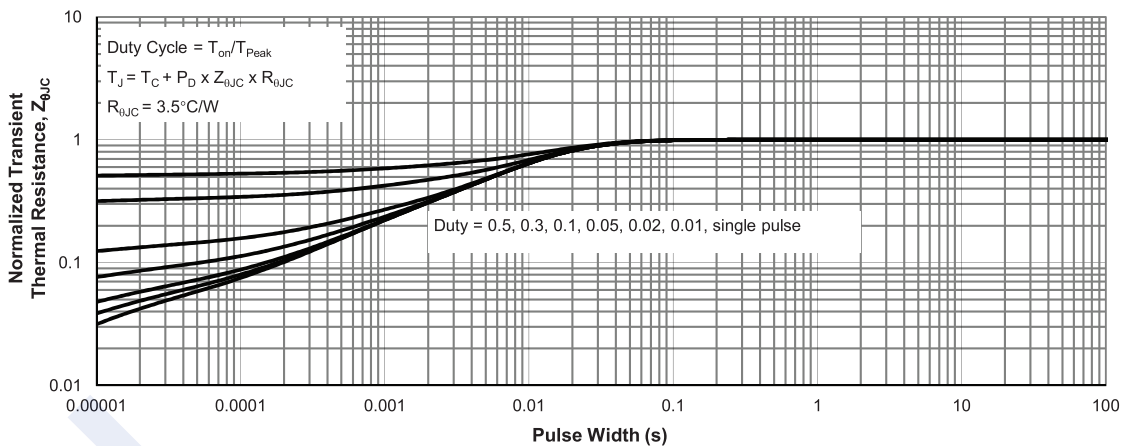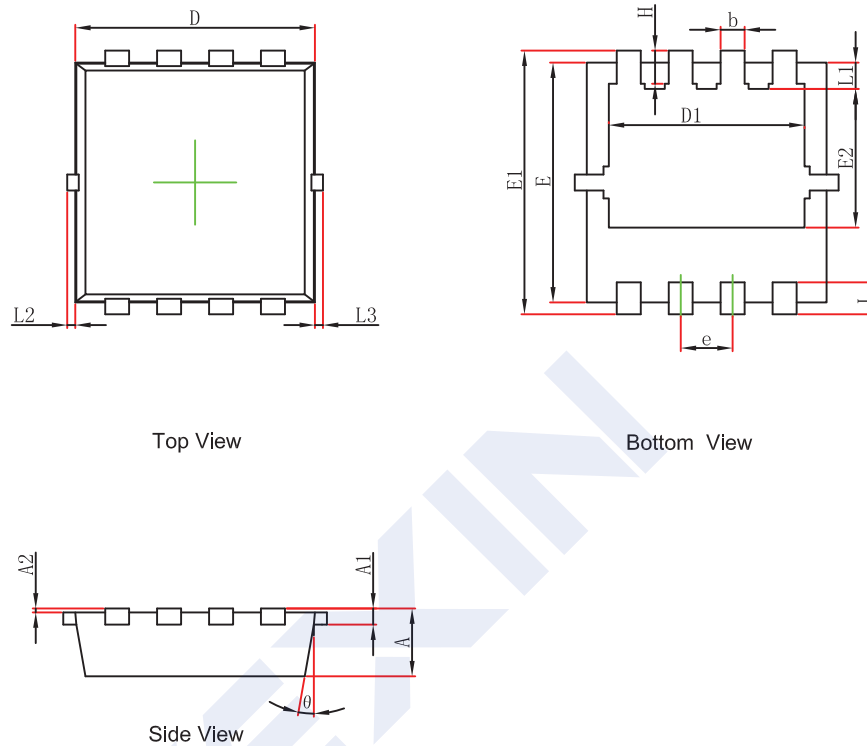**Figure 10: Single Pulse Power Rating, Junction-to-Case**

Figure 11: Normalized Maximum Transient Thermal Impedance

N-Channel MOSFET

2KK5778DFN

■ **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	3.050	3.250	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°