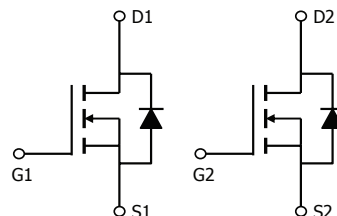


## Dual N-Channel MOSFET

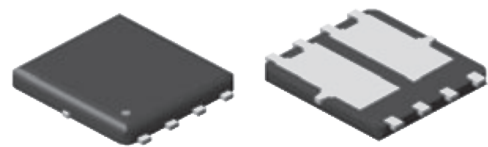
## 2KK5784DFN

## ■ Features

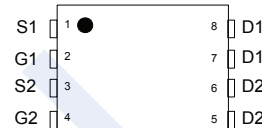
- $V_{DS} (V) = 40 V$
- $I_D = 55 A$
- $R_{DS(ON)}$  (at  $V_{GS} = 10 V$ ) =  $4.8 m\Omega(Typ.)$
- $R_{DS(ON)}$  (at  $V_{GS} = 4.5 V$ ) =  $6.8 m\Omega(Typ.)$
- 100% avalanche tested



## PDFN5x6-8A



## Top View

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

Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DS}$	40	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current (Note 1)	$I_D$	$T_C = 25^\circ C$	55	A
		$T_C = 100^\circ C$	36	
Pulsed Drain Current (Note 2)	$I_{DM}$	220		
Single Pulse Avalanche Energy (Note 3)	$E_{AS}$	81	mJ	
Power Dissipation	$P_D$	49	W	
Thermal Resistance. Junction to Ambient	$R_{\theta JA}$	49	$^\circ C/W$	
Thermal Resistance. Junction- to-Case	$R_{\theta JC}$	2.55		
Junction Temperature	$T_J$	175	$^\circ C$	
Storage Temperature Range	$T_{stg}$	-55 to 175		

## Notes:

1. Drain current limited by maximum junction temperature
2. Repetitive Rating : Pulse width limited by maximum junction temperature
3.  $L = 0.5 mH$ ,  $V_{DD} = 20V$ ,  $V_{GS} = 10V$ ,  $R_G = 25 \Omega$ , Starting  $T_J = 25^\circ C$

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■ Electrical Characteristics (T<sub>c</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0V	40			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85°C			30	
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
<b>On Characteristics</b>						
Gate to Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1.1	1.6	2.2	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A		4.8	6	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		6.8	9	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 30 A	30			S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 20 V, f = 1 MHz		2800		pF
Output Capacitance	C <sub>oss</sub>			211		
Reverse Transfer Capacitance	C <sub>rss</sub>			190		
<b>Switching Characteristics</b>						
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 3 Ω, I <sub>D</sub> = 25 A (Note 4,5)		5		ns
Turn-On Rise Time	t <sub>r</sub>			8		
Turn-Off Delay Time	t <sub>d(off)</sub>			53		
Turn-Off Fall Time	t <sub>f</sub>			23		
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 20 V, I <sub>D</sub> = 25 A (Note 4,5)		54		nC
Gate Source Charge	Q <sub>gs</sub>			8.1		
Gate Drain Charge	Q <sub>gd</sub>			8.8		
<b>Drain-Source Diode Characteristics</b>						
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>SD</sub> = 30A, di <sub>S</sub> /dt = 100 A/μs		16		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			10		nC
Maximum Body-Diode Continuous Current	I <sub>S</sub>				55	A
Maximum Body-Diode Current ( Pulsed )	I <sub>SM</sub>				220	
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 30 A			1.2	V

Notes:

4. I<sub>SD</sub> ≤ I<sub>Max</sub>, di/dt = 100A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Staring T<sub>J</sub> = 25°C
5. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
6. Essentially independent of operating temperature

## ■ Marking

Marking	K5784 KC****
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## 2KK5784DFN

■ Typical Characteristics ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Fig.1 Power Dissipation Derating Curve

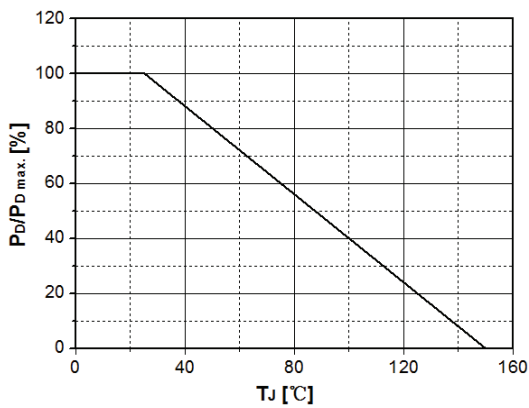


Fig.2 Avalanche Energy Derating Curve vs. Junction Temperature

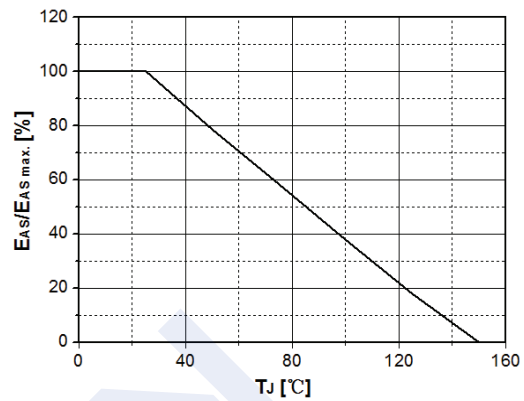


Fig.3 Typical Output Characteristics

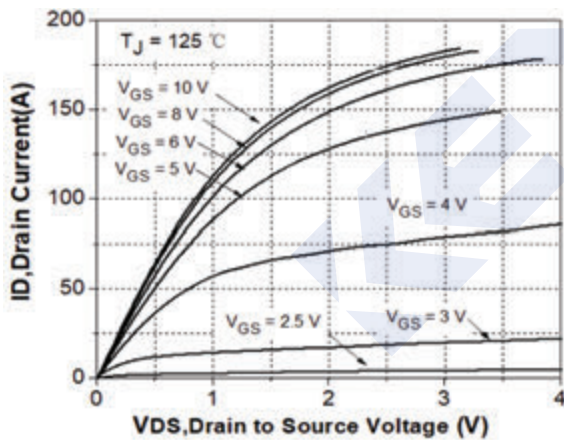


Fig. 4 Transconductance vs. Drain Current

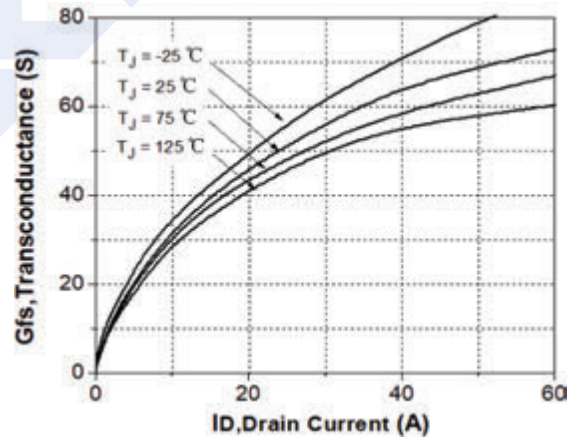


Fig.5 Typical Transfer Characteristics

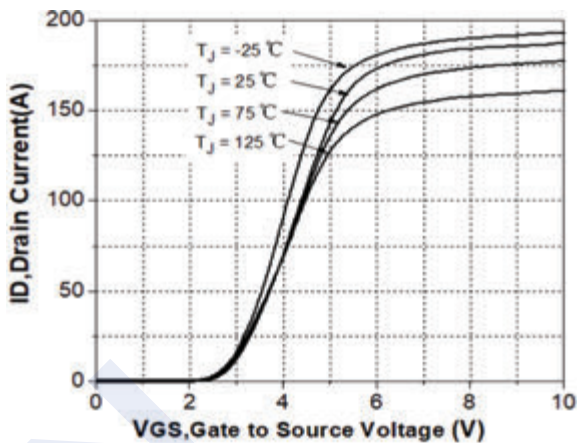
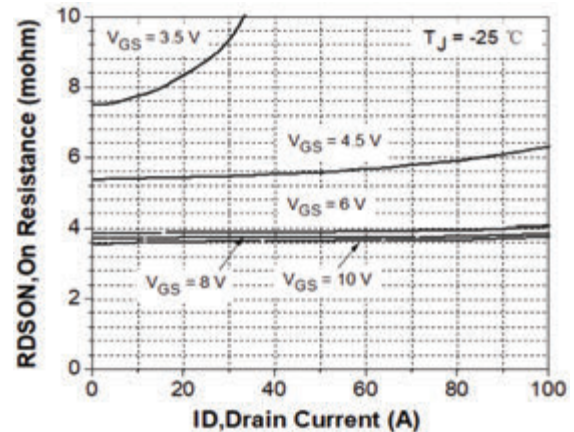


Fig. 6 State Resistance vs. Drain Current @-25°C



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Fig.7 State Resistance vs. Drain Current @25°C

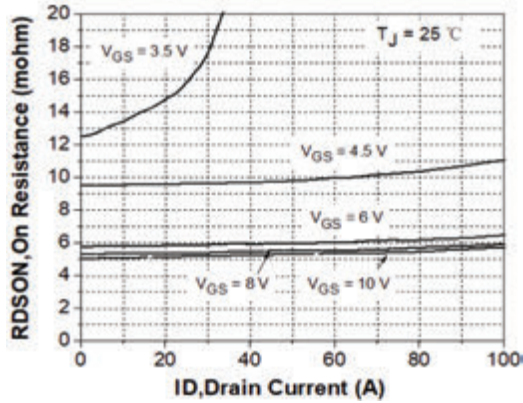


Fig. 8 State Resistance vs. Drain Current @125°C

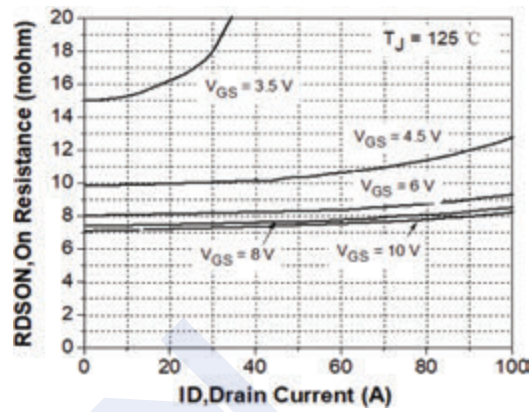


Fig.9 Typical Capacitance vs. Drain Source Voltage

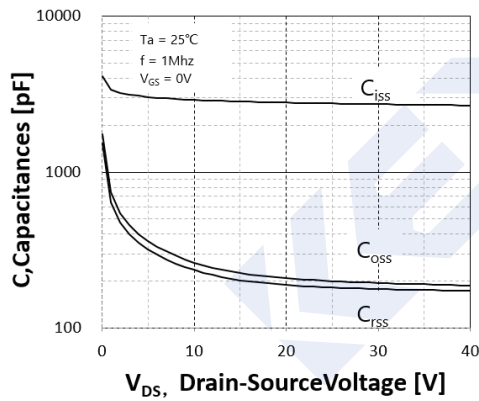


Fig.10 Dynamic Input Characteristics

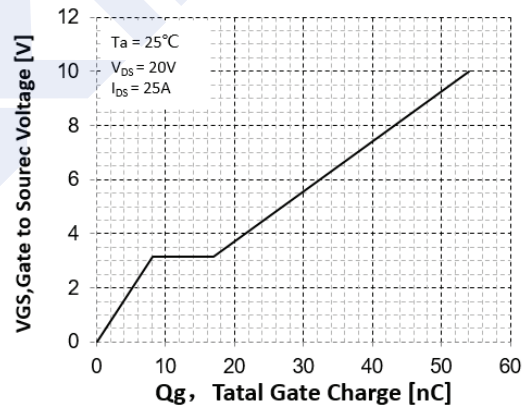


Fig.11 Breakdown Voltage vs. Junction Temperature

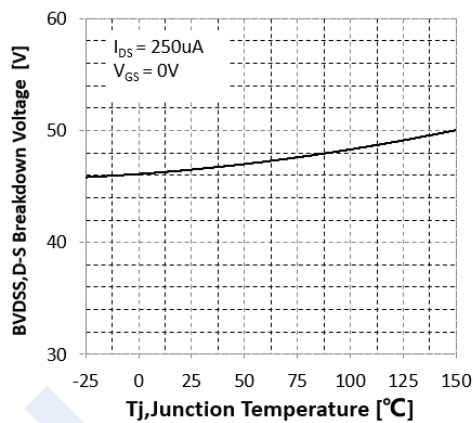
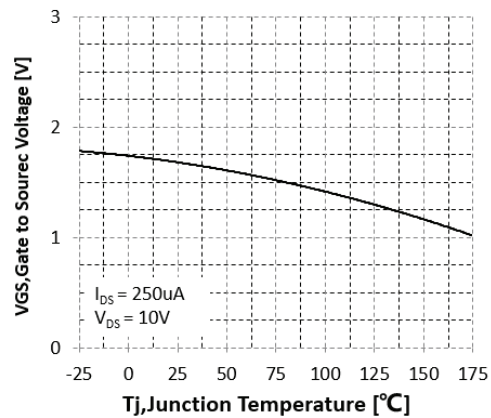


Fig. 12 Gate Threshold Voltage vs. Junction Temperature



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Fig.13 On-Resistance Variation vs. Junction Temperature

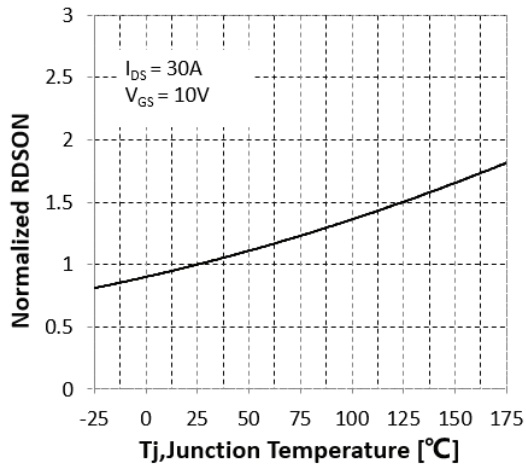


Fig.14 Maximum Drain Current vs. Case Temperature

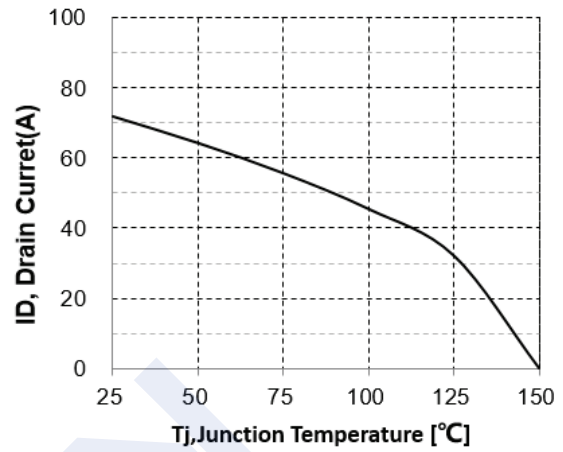
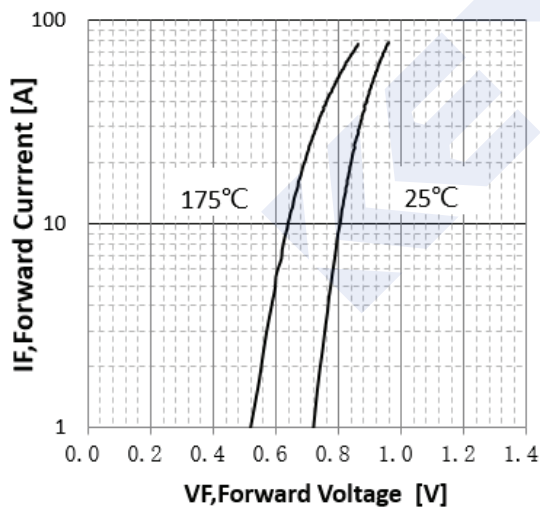


Fig.15 Body Diode Forward Voltage Vs Reverse Drain Current



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Fig.16 Safe Operating Area

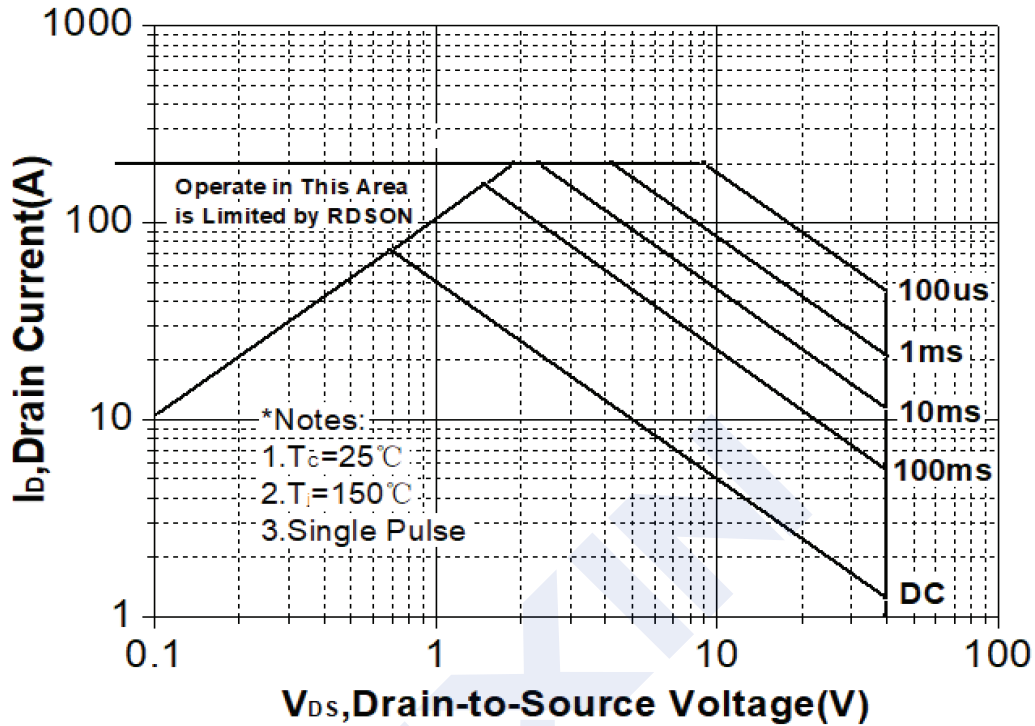
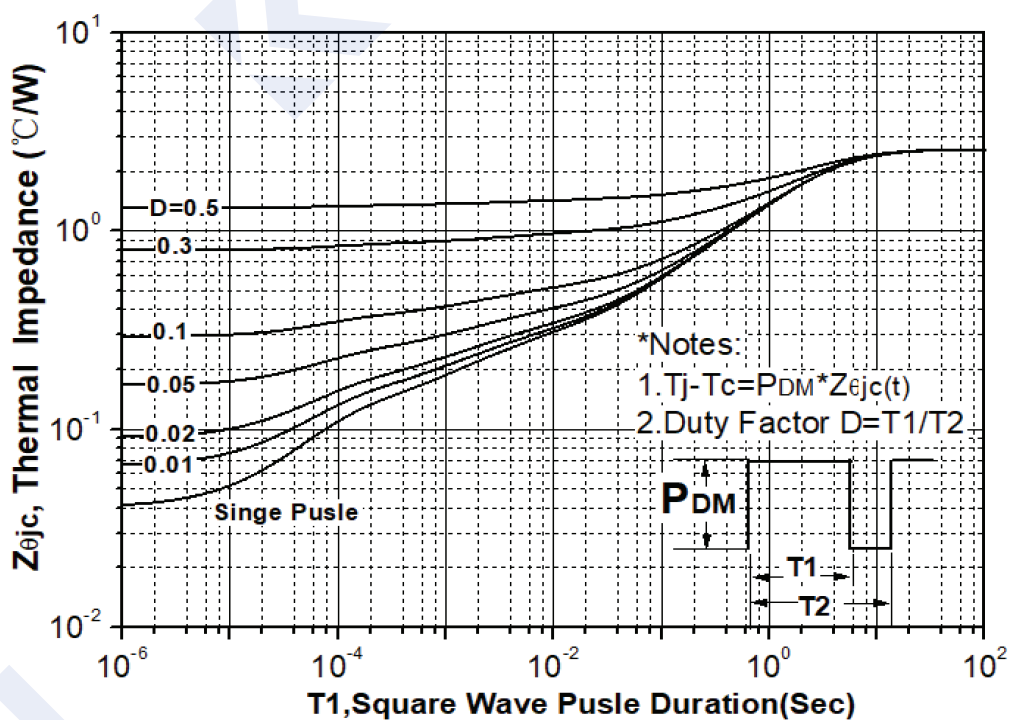
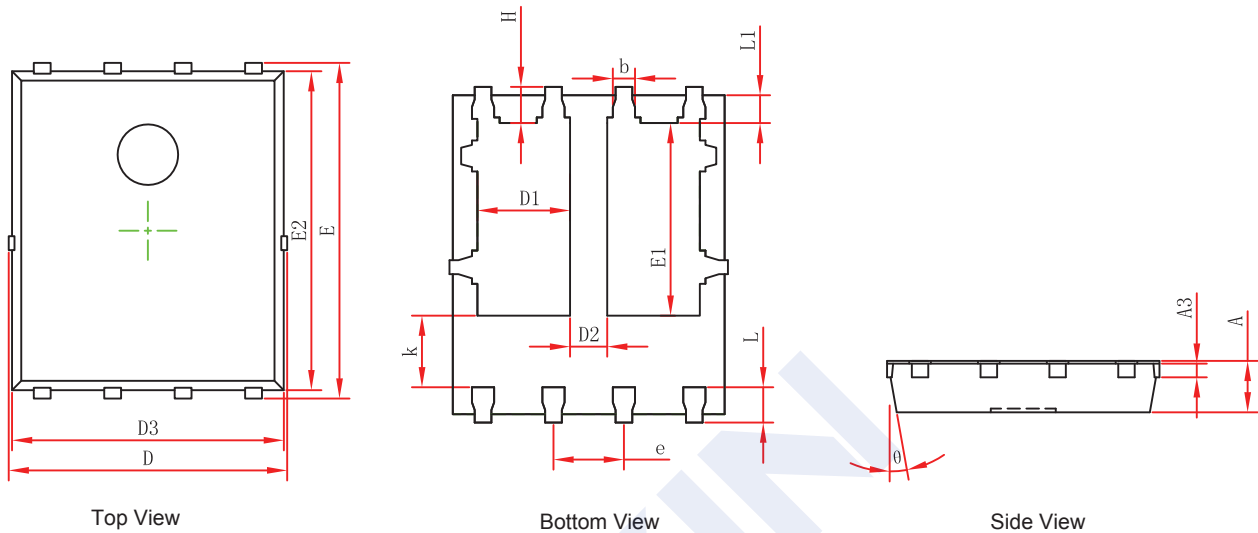


Fig. 17 Transient Thermal Response Curve



## 2KK5784DFN

## ■ PDFN5x6-8A Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254 REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	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
$\theta$	10°	12°	10°	12°