KJ1213EED

Dual N-Channel Enhancement Mode MOSFET

1. Product Information

Features

Advanced Trench Technology
Extremely Low $R_{SS(ON)}$
ESD ≥ 2 kV

Applications

Battery Protection

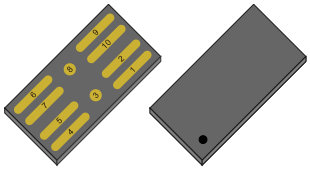
Quick reference

V_{SS} = 12 V
I_S = 13 A
$R_{SS(ON)}$ = 1.6 mΩ @V_{GS}=4.5 V (Typ.)
$R_{SS(ON)}$ = 1.8 mΩ @V_{GS}=3.8 V (Typ.)
$R_{SS(ON)}$ = 2.2 mΩ @V_{GS}=3.1 V (Typ.)
$R_{SS(ON)}$ = 3.5 mΩ @V_{GS}=2.5 V (Typ.)

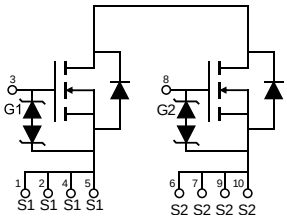
Pin Description

Pin	Description
1,2,4,5	Source (S1)
3	Gate (G1)
6,7,9,10	Source (S2)
8	Gate (G2)

Simplified Outline	Symbol



WLCSP-10L



Package Marking and Ordering Information

Product Name	Package	Marking	Reel size	Tape width	Quantity (pcs)
KJ1213EED	WLCSP-10L	1213EED	13"	8 mm	3000

2. Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	12	V
V_{GS}	Gate-Source Voltage	±8	V
I_S	Source Current, T_C=25℃	13	A
I_S	Source Current, T_C=100℃	10	A
I_{DM}	Pulsed Source Current	50	A
P_D	Power Dissipation	0.5	W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	250	℃/W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	℃

3. Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{SSS}	Source to Source Breakdown Voltage	V_{GS}=0 V, I_D=250 μA	12	-	-	V
I_{SSS}	Zero Gate Voltage drain current	V_{DS}=12 V, V_{GS}=0 V	-	-	1	μA
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0 V, V_{GS}=±8 V	-	-	±10	μA
$V_{GS(th)}$	Gate-Threshold Voltage [1]	V_{DS}=V_{GS}, I_D=1000 μA	0.55	0.95	1.35	V
$R_{DS(ON)}$	Static Source to Source On-State Resistance [1]	V_{GS}=4.5 V, I_D=4 A	-	1.6	2.4	mΩ
		V_{GS}=3.8 V, I_D=4 A	-	1.8	2.7	
		V_{GS}=3.1 V, I_D=4 A	-	2.2	3.5	
		V_{GS}=2.5 V, I_D=4 A	-	3.5	5.5	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS}=0 V, V_{SS}=10 V, f=1.0 MHz	-	3500	-	pF
C_{oss}	Output Capacitance		-	450	-	
C_{rss}	Reverse Transfer Capacitance		-	400	-	
Switching Characteristics						
Q_g	Total Gate Charge	V_{SS}=6 V, V_{GS}=4.5 V, I_D=4 A	-	23	-	nC
Q_{gs}	Gate-Source Charge		-	11	-	
Q_{gd}	Gate-Drain Charge		-	5	-	
$t_{d(on)}$	Turn-on Delay Time	V_{SS}=6 V, V_{GS}=4.5 V, I_D=4 A, R_G=3 Ω	-	0.6	-	ns
t_r	Turn-on Rise Time		-	1.4	-	
$t_{d(off)}$	Turn-off Delay Time		-	6.6	-	
t_f	Turn-off Fall Time		-	4	-	

Note:

1. Pulse Test: Pulse width ≤ 300 μs, Duty cycle ≤ 2%.
2. Surface mounted on a 1 $inch^2$ FR-4 board with 2 OZ copper.

4. Typical Characteristics

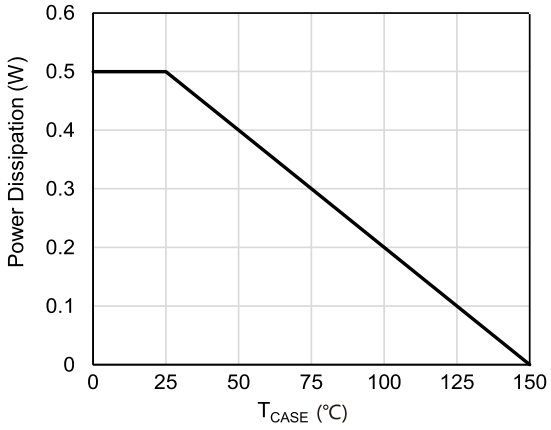


Figure 1. Power De-rating

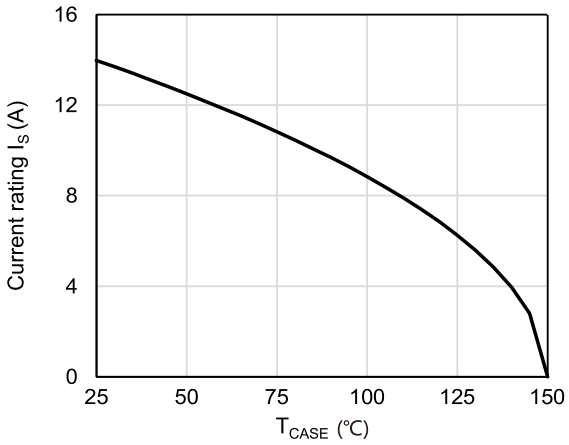


Figure 2. Current De-rating

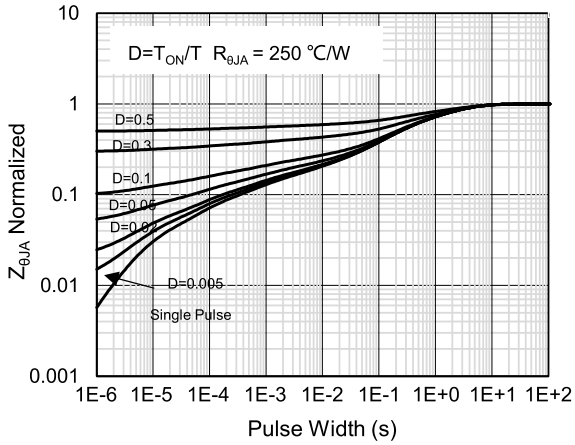


Figure 3. Normalized Maximum Transient Thermal Impedance

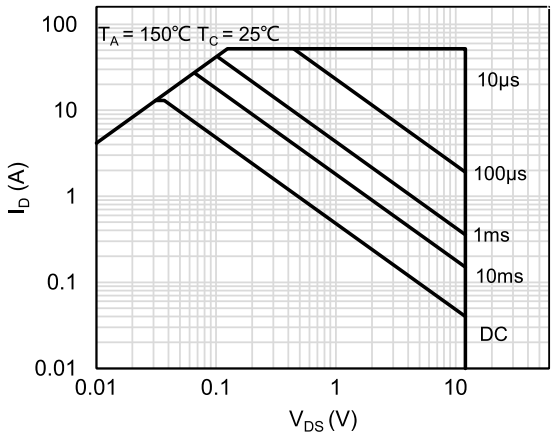


Figure 4. Maximum Forward Biased Safe Operating Area

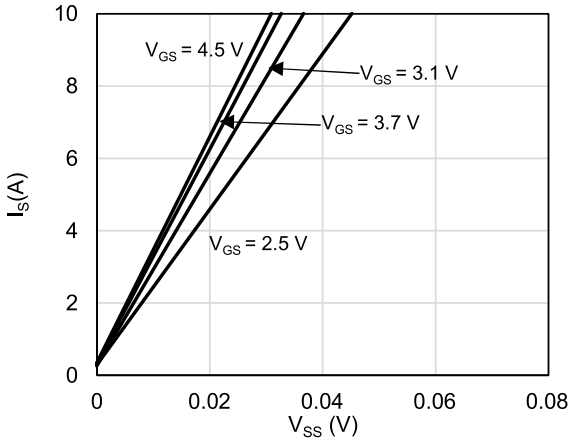


Figure 5. Output Characteristics

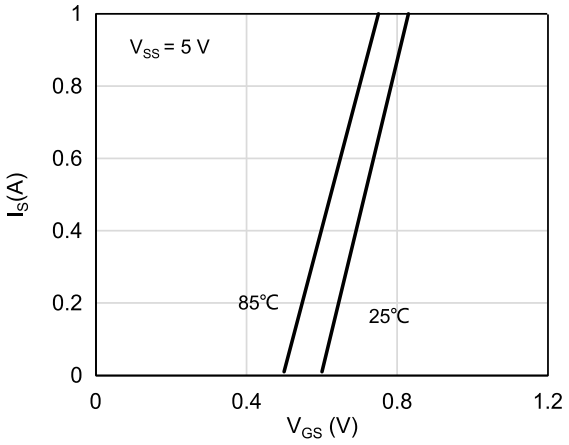


Figure 6. Typical Transfer Characteristics

4. Typical Characteristics (cont.)

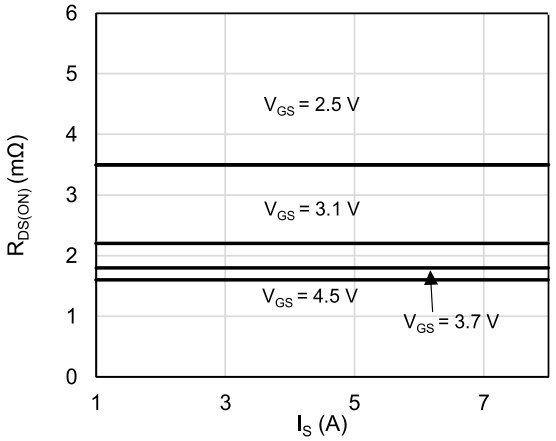


Figure 7. On-resistance vs. Source Current

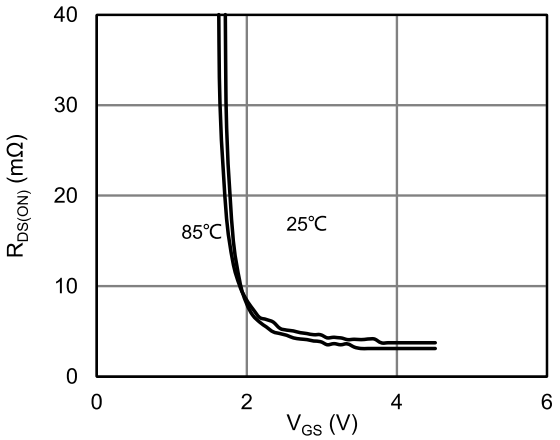


Figure 8. On-Resistance vs. Gate-Source Voltage

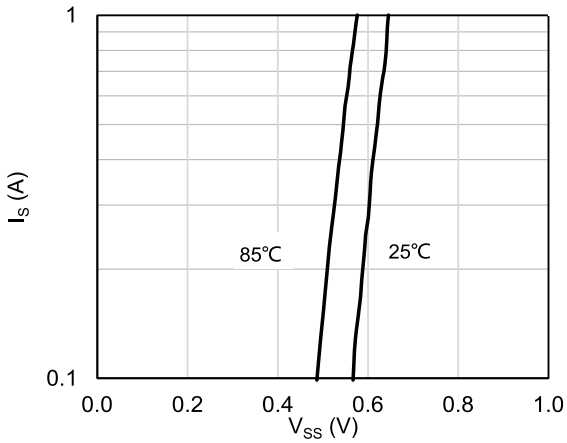


Figure 9. Gate Voltage vs. Gate Leakage Current

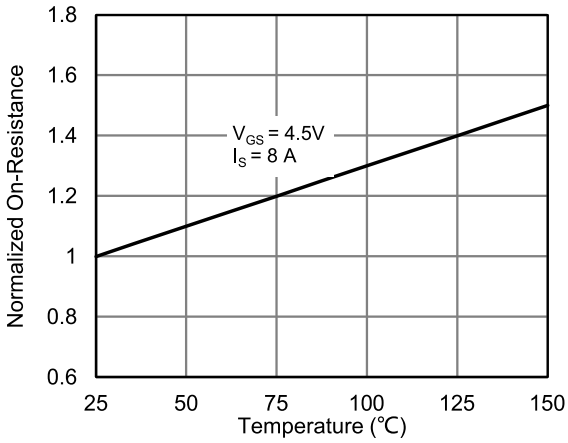


Figure 10. Gate-Charge Characteristics

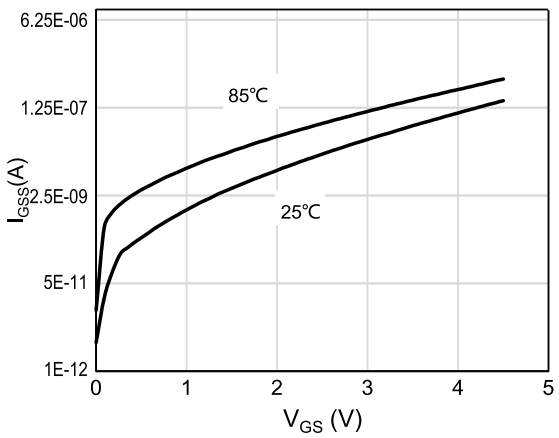


Figure 11. Body-Diode Characteristics

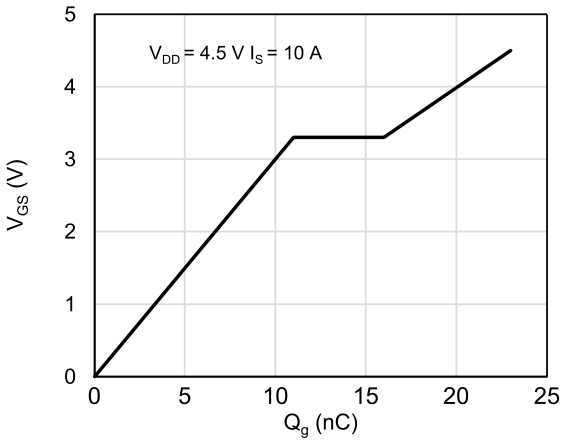
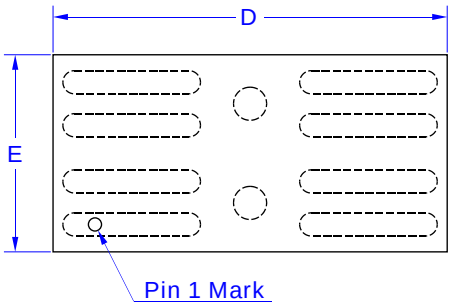


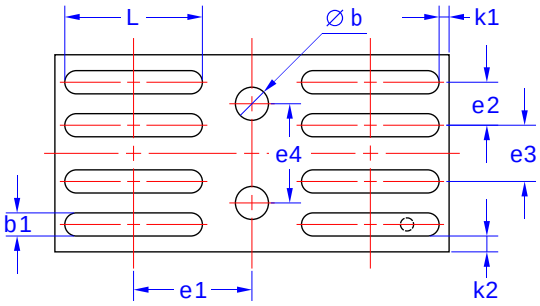
Figure 12. On-Resistance vs. Junction Temperature

5. Package Mechanical Data

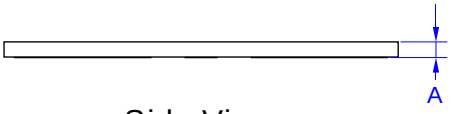
WLCSP-10L Package



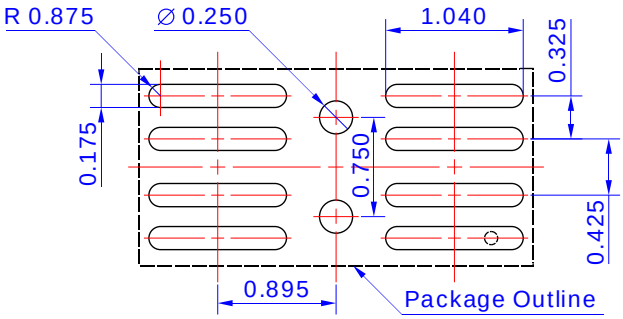
Top View



Bottom View



Side View



Unit: mm

Soldering Footprint

Symbol	Dimensions in Millimeters		
	MIN.	NOM.	MAX.
A	0.084	0.114	0.144
D	2.950	2.980	3.010
E	1.460	1.490	1.520
b	0.220	0.250	0.280
b1	0.145	0.175	0.205
e1	0.895 BSC.		
e2	0.325 BSC.		
e3	0.425 BSC.		
e4	0.750 BSC.		
L	1.010	1.040	1.070
k1		0.075	
k2		0.120	