

## Features

- Uses PingWei advanced PerfectMOS4 technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent  $Q_g \times R_{DS(on)}$  product(FOM)
- Excellent Low Ciss
- Qualified according to JEDEC criteria

## Benefits

- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density
- Easy paralleling

## Applications

- Synchronous Rectification for AC/DC Quick Charger
- Battery management
- UPS (Uninterruptible Power Supplies)

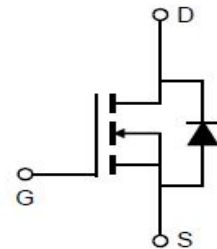
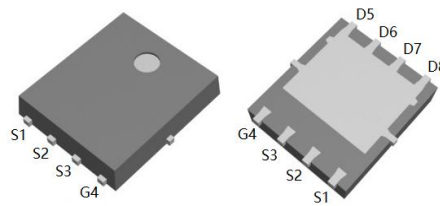


**100% DVDS Tested**  
**100% Avalanche Tested**

## Product Summary

$V_{DS}$	45V
$R_{DS(on)@10V \text{ typ}}$	1.2mΩ
$R_{DS(on)@4.5V \text{ typ}}$	2mΩ
$I_D$	225A

DFN5x6



## Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
PWC015N04ESL	C015N04ESL	DFN5x6	Tape&Reel	13 inches	12mm	5000pcs

## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	45	V
Continuous drain current	$I_D$	225	A
$T_C = 25^\circ\text{C}$ (Silicon limit)		300	
$T_C = 25^\circ\text{C}$ (Package limit)		142	
$T_C = 100^\circ\text{C}$ (Silicon limit)		25	
$T_a = 25^\circ\text{C}$			
Pulsed drain current ( $T_C = 25^\circ\text{C}$ , $t_p = 100\mu\text{s}$ )	$I_{D \text{ pulse}}$	900	A
Avalanche energy, single pulse ( $L=0.5\text{mH}$ , $V_{ds}=32\text{V}$ )	$E_{AS}$	121	mJ
Gate-Source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation	$P_{tot}$	125	W
$T_C = 25^\circ\text{C}$		1.5	
$T_a = 25^\circ\text{C}$			
Operating junction and storage temperature	$T_j, T_{stg}$	-55...+150	$^\circ\text{C}$
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	$T_{sold}$	260	$^\circ\text{C}$



## Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	RthJC	-	-	1.0	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	RthJA	-	-	81	°C/W	-

## Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

## Static Characteristic

Drain-source breakdown voltage	$BV_{DSS}$	45	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	1.2	-	2.4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	0.05	1	$\mu A$	$V_{DS}=45V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=150^\circ C$
Gate-source leakage current	$I_{GSS}$	-	$\pm 10$	$\pm 100$	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.2	1.5	$m\Omega$	$V_{GS}=10V, I_D=20A$ $V_{GS}=4.5V, I_D=20A$
Transconductance	$g_{fs}$	-	45	-	S	$V_{DS}=5V, I_D=20A$

## Dynamic Characteristic

Input Capacitance	$C_{iss}$	-	3983	-	pF	$V_{GS}=0V, V_{DS}=20V,$ $f=1MHz$
Output Capacitance	$C_{oss}$	-	1461	-		
Reverse Transfer Capacitance	$C_{rss}$	-	174	-		
Gate Total Charge	$Q_G$	-	74	-	nC	$V_{DS}=20V, I_D=50A,$ $V_{GS}=10V$
Gate-Source charge	$Q_{gs}$	-	16	-		
Gate-Drain charge	$Q_{gd}$	-	16	-		
Turn-on delay time	$t_{d(on)}$	-	0.6	-	ns	$V_{GS}=10V, V_{DD}=20V,$ $R_{G\_ext}=2.2\Omega, I_D=29A$
Rise time	$t_r$	-	1.4	-		
Turn-off delay time	$t_{d(off)}$	-	54.8	-		
Fall time	$t_f$	-	2.2	-		
Gate resistance	$R_G$	-	2	-	$\Omega$	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$



## Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	$V_{SD}$	-	0.8	1.2	V	$V_{GS}=0V, I_{SD}=20A$
Body Diode Continuous Forward Current	$I_S$	-	-	225	A	$TC = 25^{\circ}C$
Body Diode Pulsed Current	$I_S$ pulse	-	-	900	A	$TC = 25^{\circ}C$
Body Diode Reverse Recovery Time	$t_{rr}$	-	98	-	ns	$I_F=20A, V_R=27V,$ $dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	258	-	nC	



## Typical Performance Characteristics

Fig 1: Output Characteristics

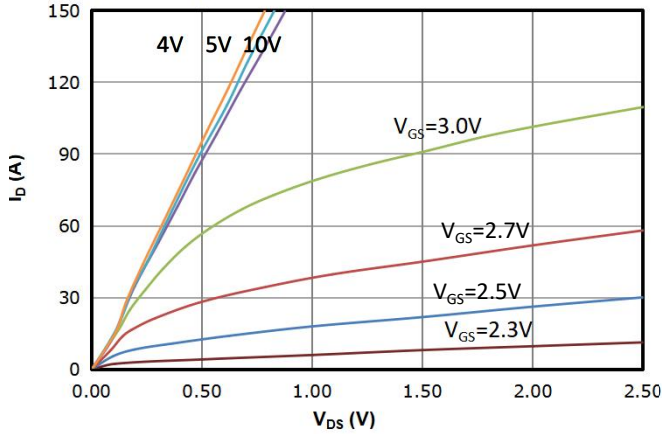


Fig 2: Transfer Characteristics

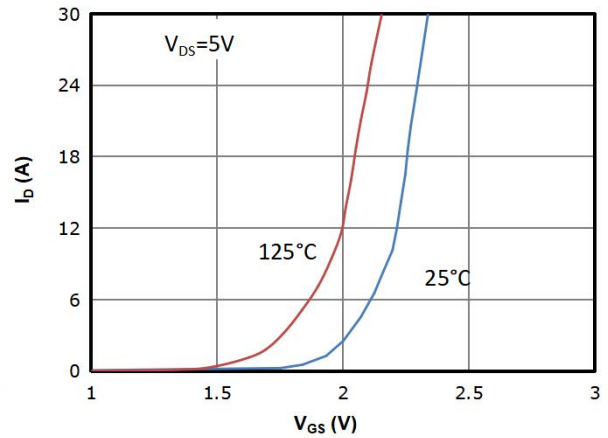


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

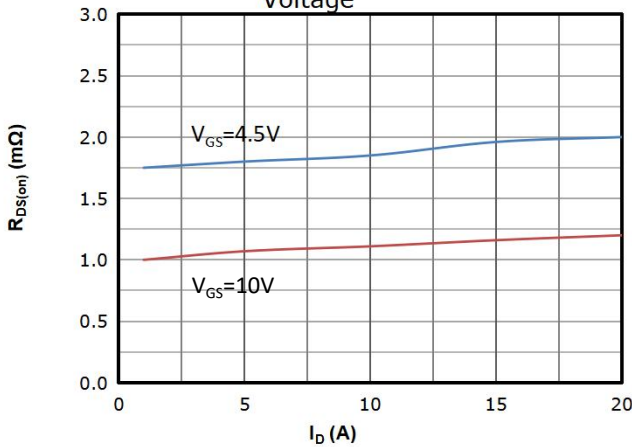


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

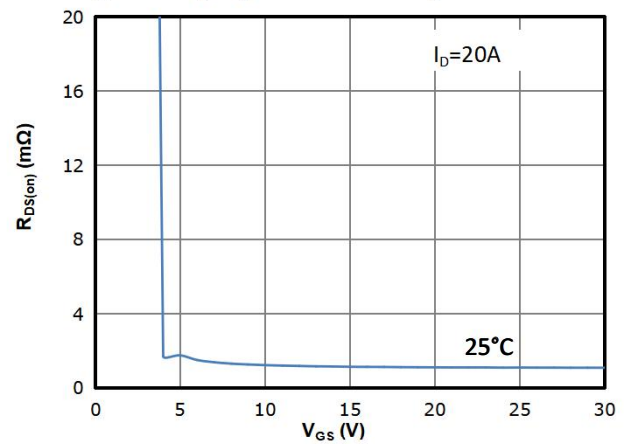


Fig 5:  $R_{DS(on)}$  vs. Temperature

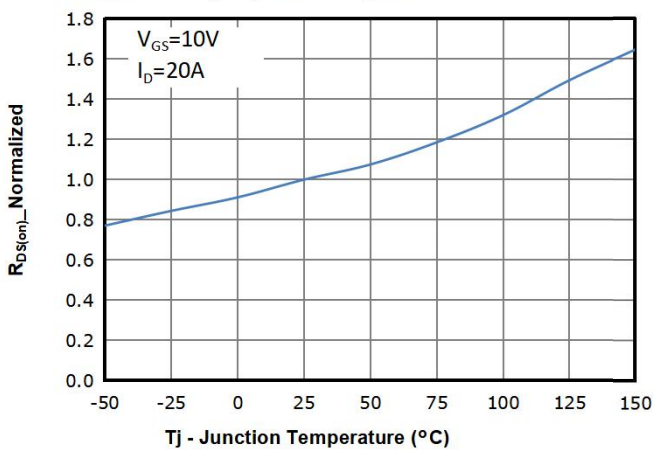


Fig 6:  $V_{GS(th)}$  vs. Temperature

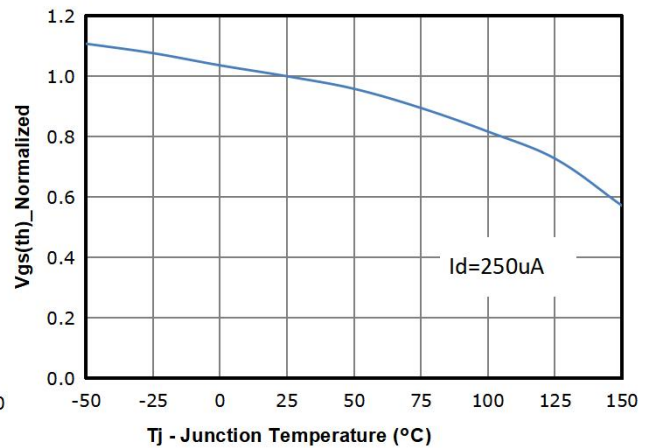




Fig 7: BVdss vs. Temperature

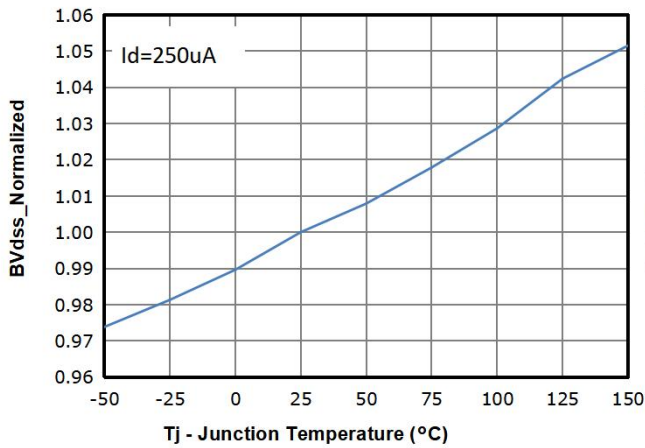


Fig 8: Capacitance Characteristics

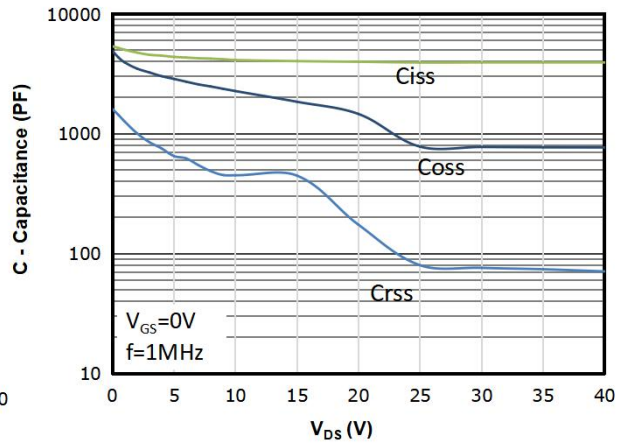


Fig 9: Gate Charge Characteristics

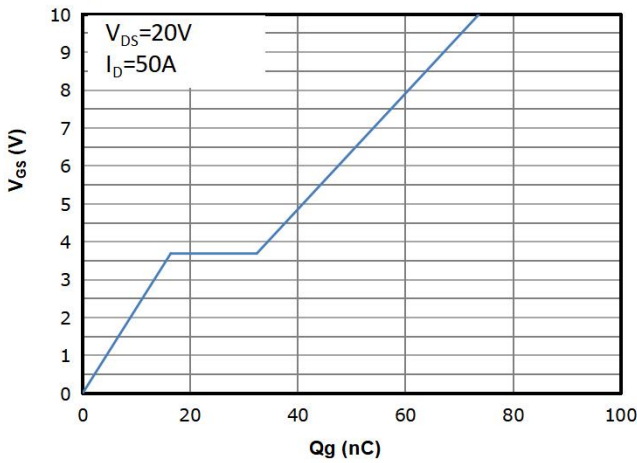


Fig 10: Body-diode Forward Characteristics

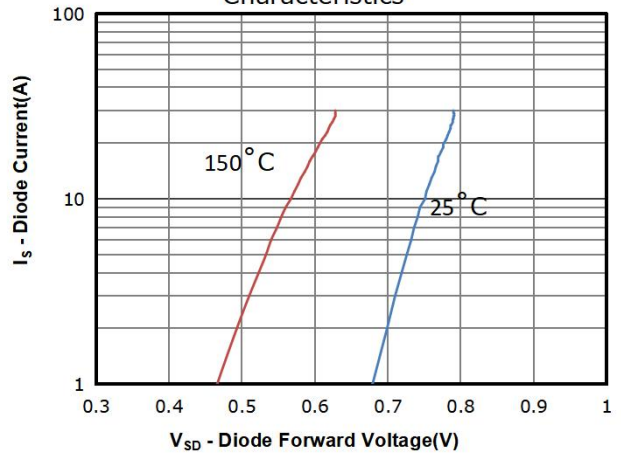


Fig 11: Power Dissipation

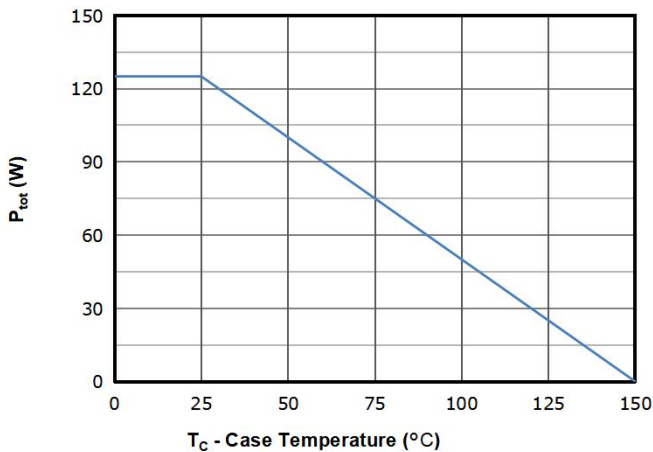


Fig 12: Drain Current Derating

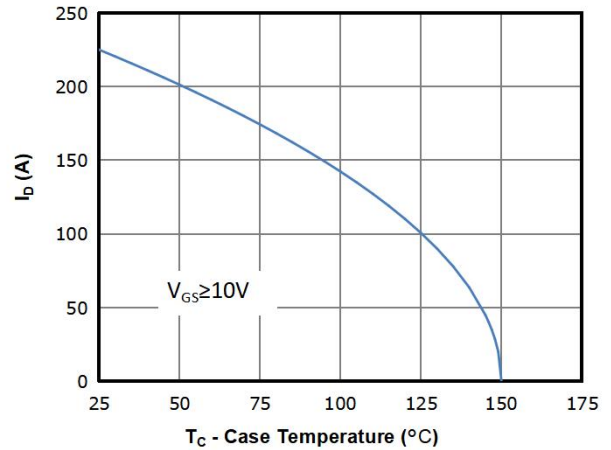




Fig 13: Safe Operating Area

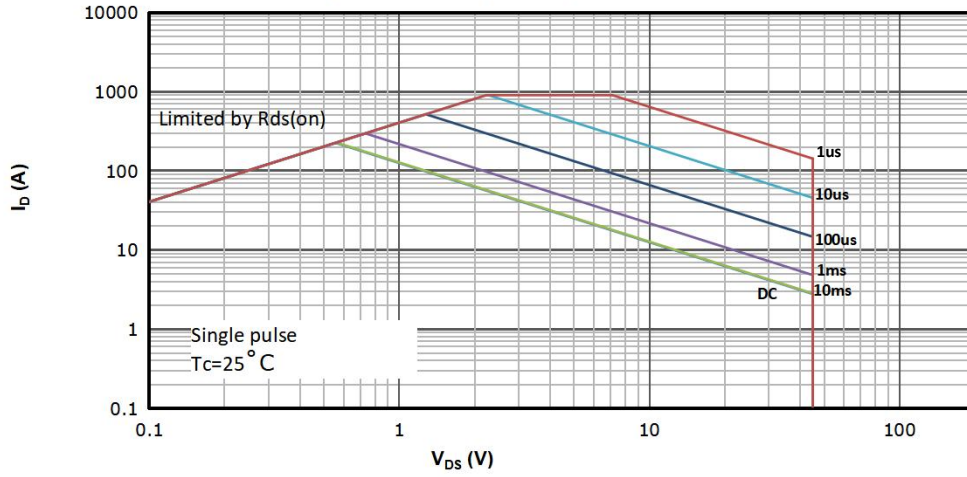
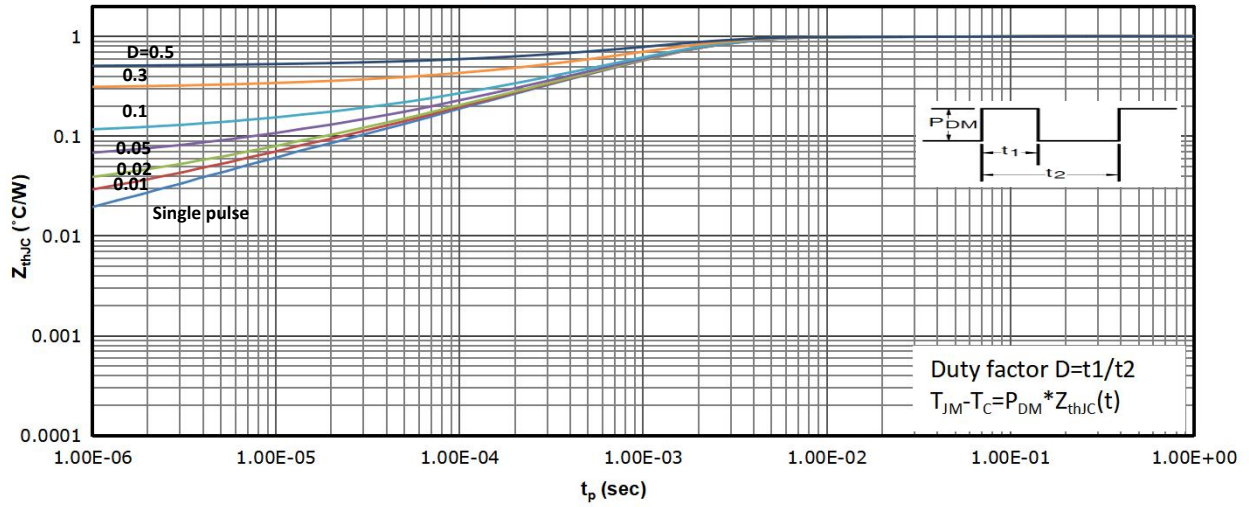
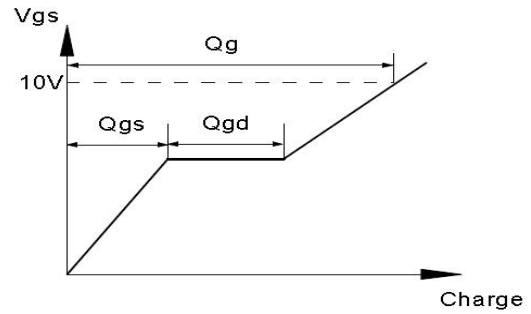
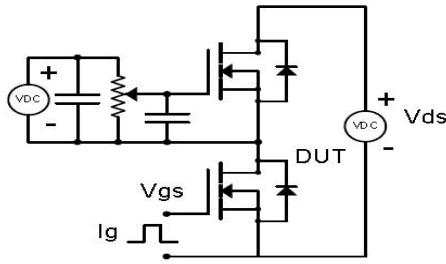


Fig 14: Max. Transient Thermal Impedance

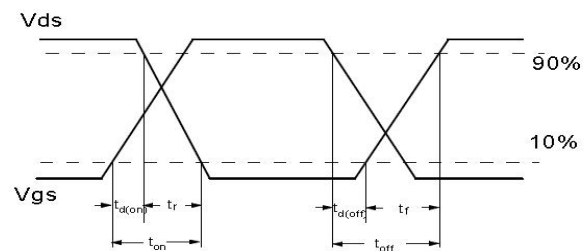
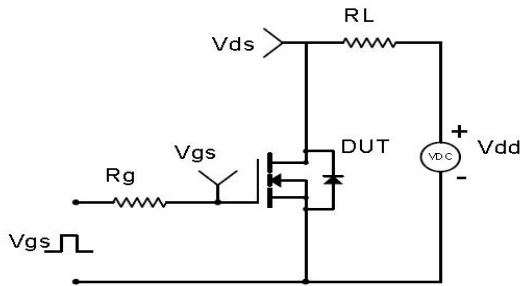


## Test Circuit & Waveform

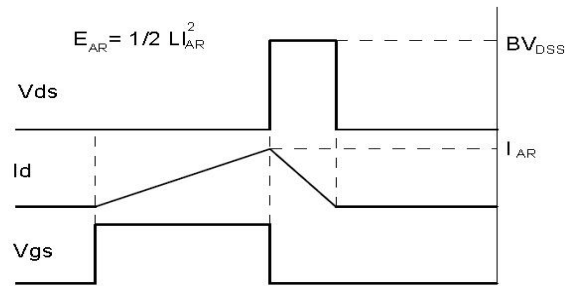
Gate Charge Test Circuit & Waveform



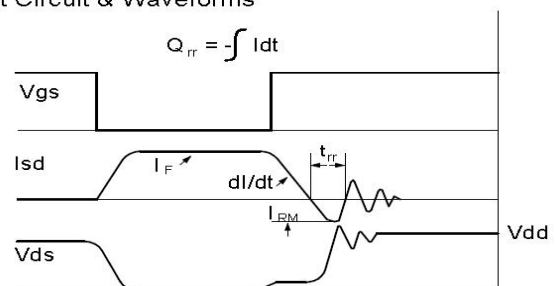
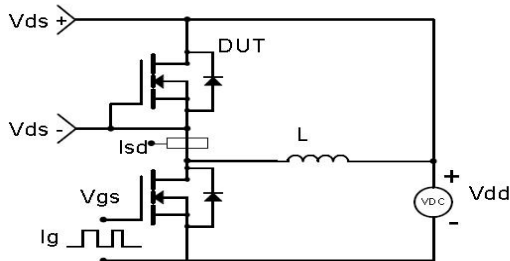
Resistive Switching Test Circuit & Waveforms



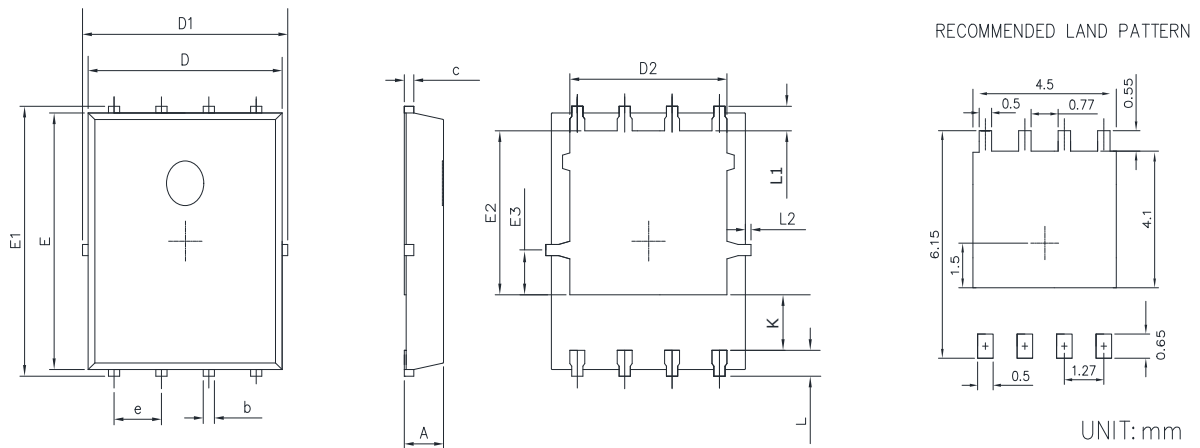
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## Package Outline: DFN5X6



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.25	0.50	0.010	0.020
c	0.10	0.30	0.004	0.012
D	4.80	5.30	0.189	0.209
D1	4.90	5.50	0.193	0.217
D2	3.92	4.20	0.154	0.165
E	5.65	5.85	0.222	0.230
E1	5.90	6.20	0.232	0.244
E2	3.33	3.78	0.131	0.149
E3	0.80	1.00	0.031	0.039
e	1.27		0.050	
L	0.40	0.70	0.016	0.028
L1	0.65		0.026	
L2	0.00	0.15	0.000	0.006
K	1.00	1.50	0.039	0.059





## Revision History

Revision	Date	Major changes
1.0	2022/10/25	Release of Formal Version.

## Disclaimer

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