PW165004HLQ

Perfect MOS N+P MOSFET 40V

重庆平伟实业股份有限公司

Features

- Uses PingWei advanced PerfectMOS technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g x R_{DS(on)}$ product(FOM)
- Qualified according to AEC-Q101 criteria

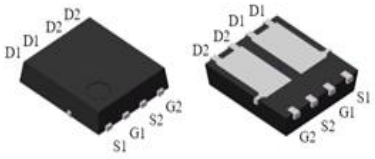
RoHS HF

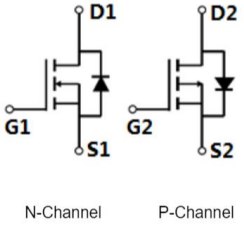
100% DVDS Tested
100% AvalancheTested

Applications

- General Automotive Applications

DFN3*3双基岛





N-channel	
V_{DS}	40V
$R_{DS(on)@10V\ typ}$	14mΩ
$R_{DS(on)@4.5V\ typ}$	18mΩ
I_D	14A

P-channel	
V_{DS}	-40V
$R_{DS(on)@10V\ typ}$	34mΩ
$R_{DS(on)@4.5V\ typ}$	46mΩ
I_D	-13A

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
PW165004HLQ	165004HLQ	DFN3*3双基岛	Tape&Reel	13 inches	12mm	5000pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**N-channel**	**P-channel**	**Unit**
Drain-source voltage	V_{DS}	40	-40	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	 29 14 20	 -17 -14 -12	A
Pulsed drain current (T_C = 25°C,tp=100us)	$I_{D\ pulse}$	102	-54	A
Avalanche energy, single pulse (L=0.1mH)	E_{AS}	12	15	mJ
Gate-Source voltage	V_{GS}	±20	±20	V
Power dissipation T_C = 25°C	P_{tot}	 26	 25	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	-55...+175	°C
Reflow soldering temperature（10s）	Tsold	260	260	°C

NMOS Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	RthJC	-	-	5.8	°C/W	-
Thermal resistance, junction - ambient	RthJA	-	-	59	°C/W	40x40x1.6mm,2oz single copper FR-4 PCB

NMOS 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}	40	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	1.2	1.8	2.5	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	1 100	μA	V_{DS}=40V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	14	16.5	mΩ	Vgs=10V,Id=7A
		-	18	24		Vgs=4.5V,Id=7A
Transconductance	g_{fs}	-	20	-	S	V_{DS}=5V,I_D=20A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	1108	1662	pF	V_{GS}=0V, V_{DS}=20V, f=100KHz
Output Capacitance	C_{oss}	-	90	135		
Reverse Transfer Capacitance	C_{rss}	-	70	112		
Gate Total Charge	Q_G	-	21	34	nC	Vds=20V,Id=7A ,Vgs=10V
Gate-Source charge	Q_{gs}	-	5	10		
Gate-Drain charge	Q_{gd}	-	4	8		
Turn-on delay time	$t_{d(on)}$	-	5	-	ns	V_{GS}=10V, V_{DD}=20V, R_{G_ext}=1.8Ω,I_D=7A
Rise time	t_r	-	12	-		
Turn-off delay time	$t_{d(off)}$	-	22	-		
Fall time	t_f	-	3	-		
Gate resistance	R_G	-	2	-	Ω	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}=7A
Body Diode Continuous Forward Current	Is	-	-	14	A	TC = 25°C
Body Diode Pulsed Current	Is pulse	-	-	102	A	TC = 25°C,tp=100us
Body Diode Reverse Recovery Time	t_{rr}	-	12	-	ns	I_F=20A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	7	-	nC	

1)100% FT tested at VDS=30V, f=1MHz.

NMOS Typical Performance Characteristics

Fig 1: Output Characteristics

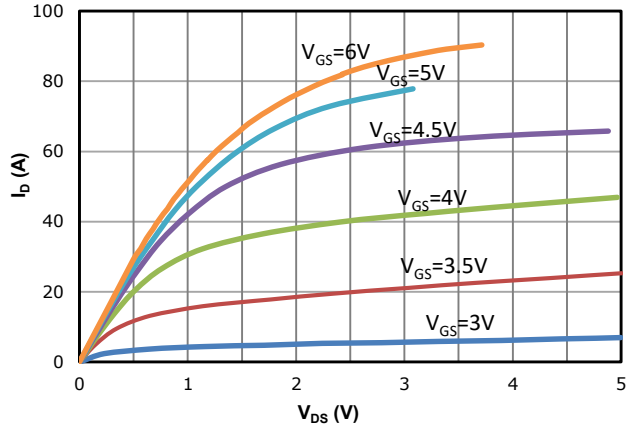


Fig 2: Transfer Characteristics

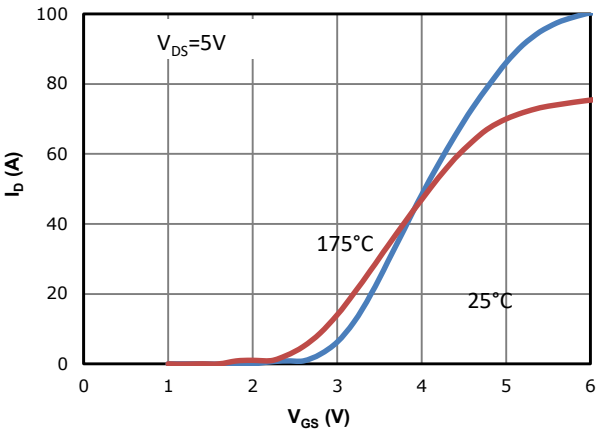


Fig 3: Rds(on) vs Drain Current and Gate Voltage

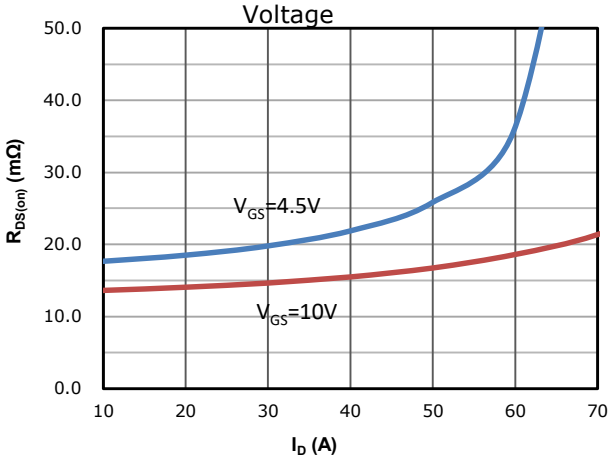


Fig 4: Rds(on) vs Gate Voltage

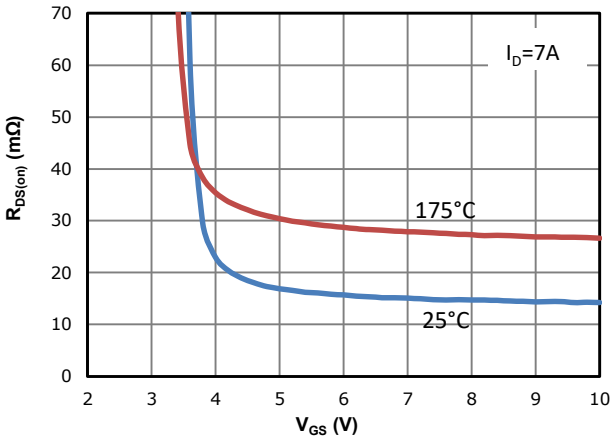


Fig 5: Rds(on) vs. Temperature

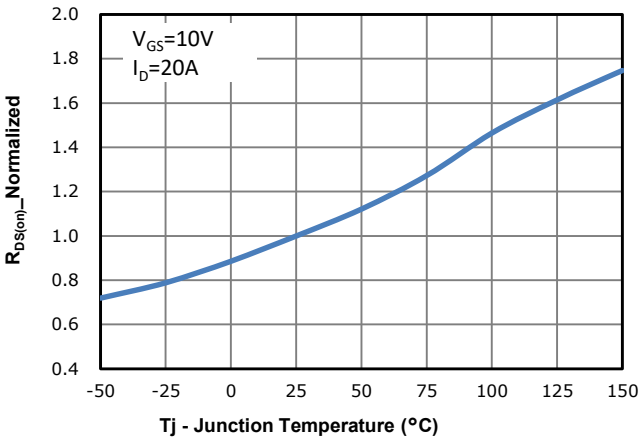


Fig 6: Vgs(th) vs. Temperature

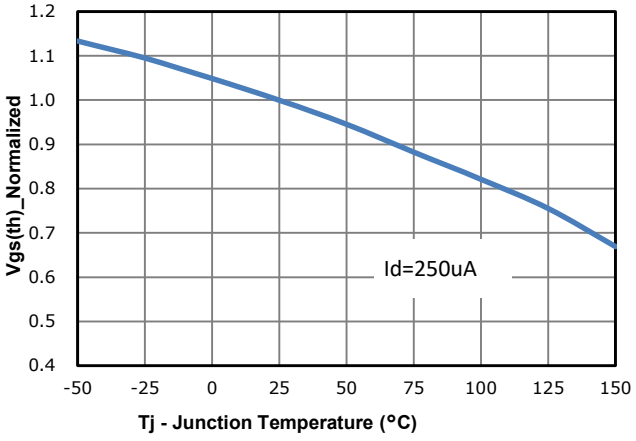


Fig 7: BVdss vs. Temperature

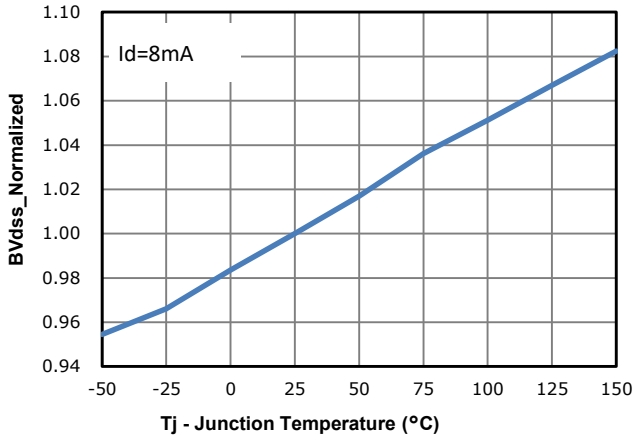


Fig 8: Capacitance Characteristics

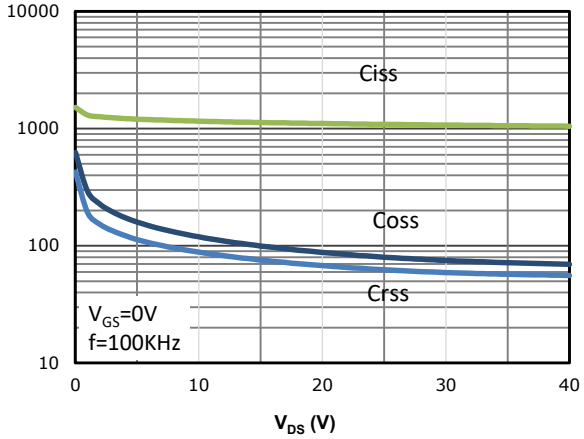


Fig 9: Gate ChargeCharacteristics

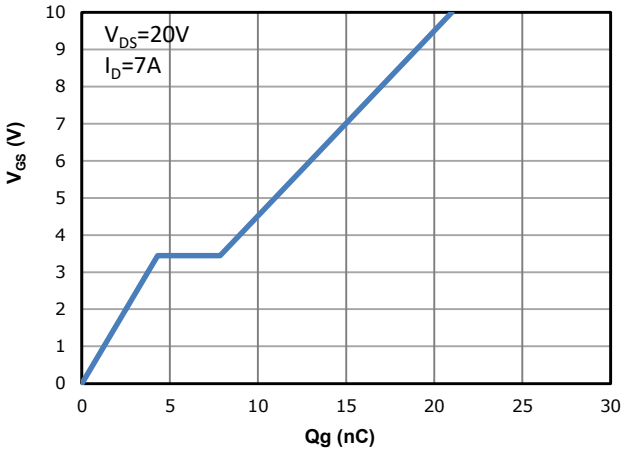


Fig 10: Body-diode Forward Characteristics

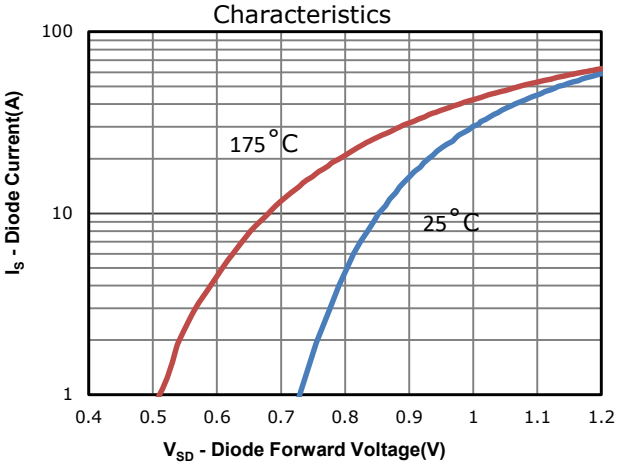


Fig 11: Power Dissipation

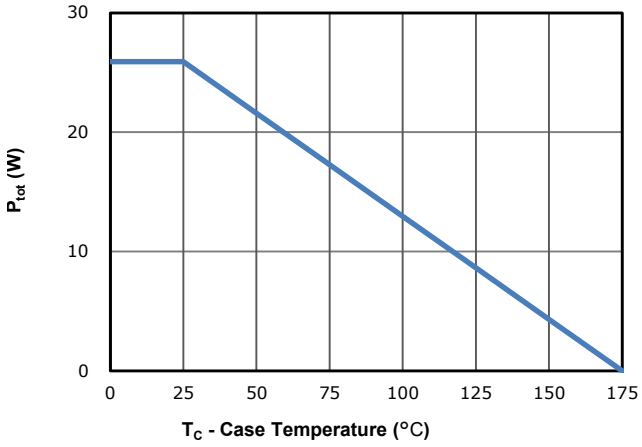


Fig 12: Drain Current Derating

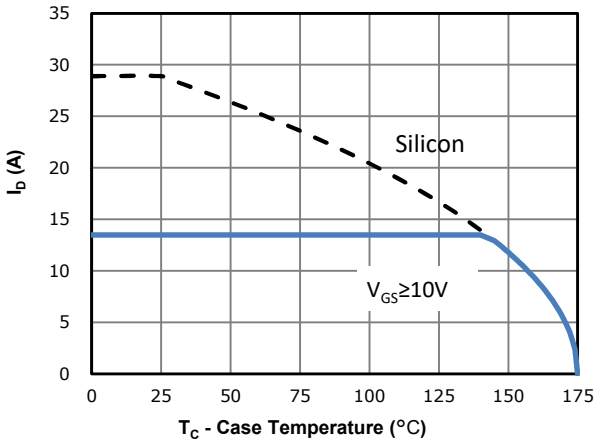


Fig 13: Safe Operating Area

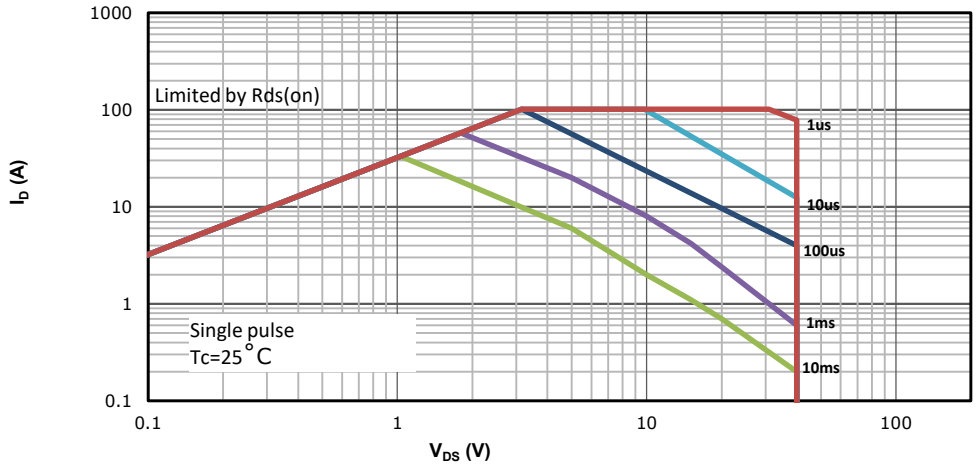
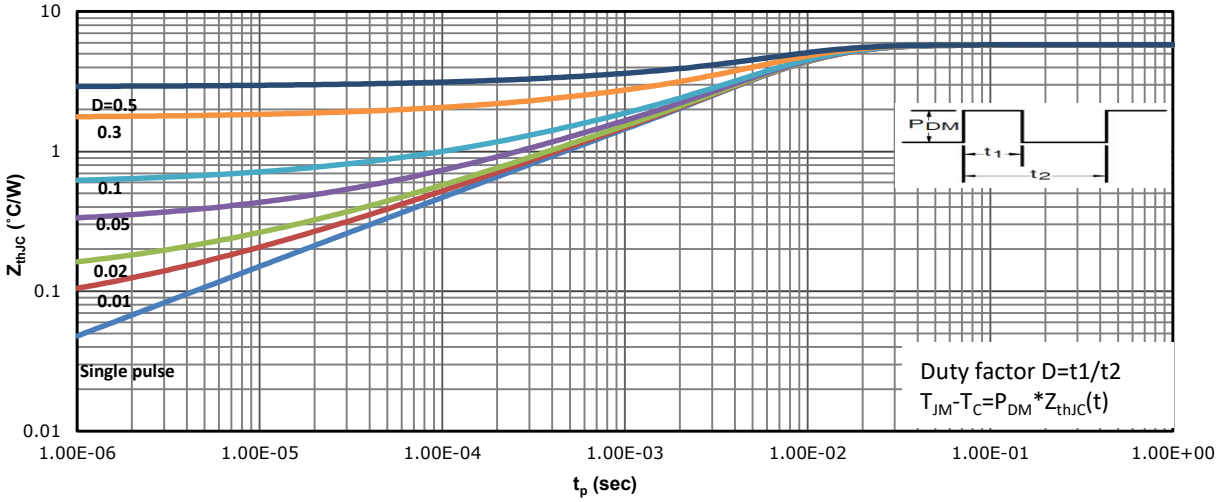
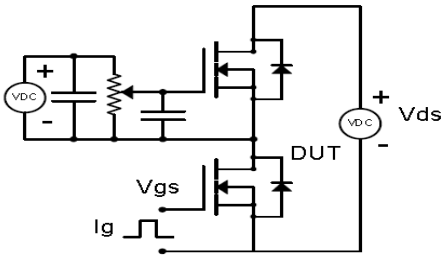


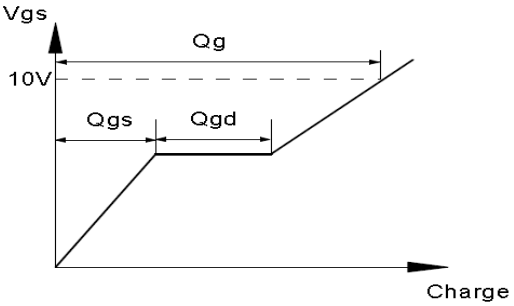
Fig 14: Max. Transient Thermal Impedance



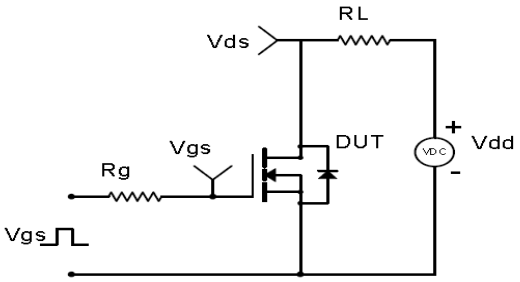
NMOS Test Circuit & Waveform

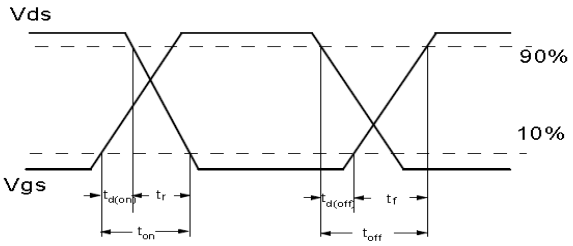
Gate Charge Test Circuit & Waveform



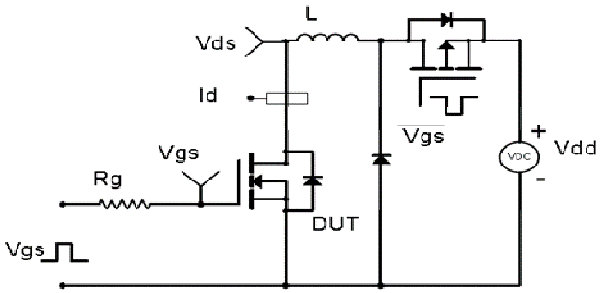


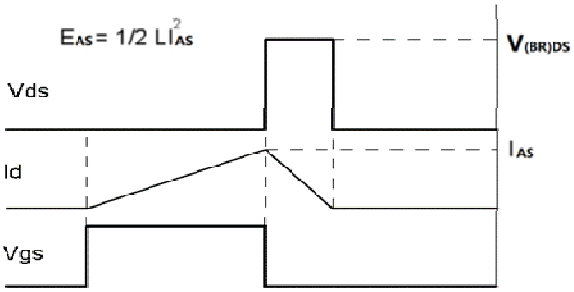
Resistive Switching Test Circuit & Waveforms



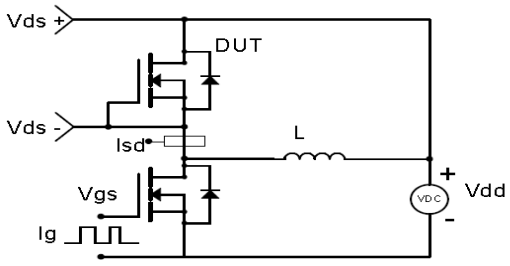


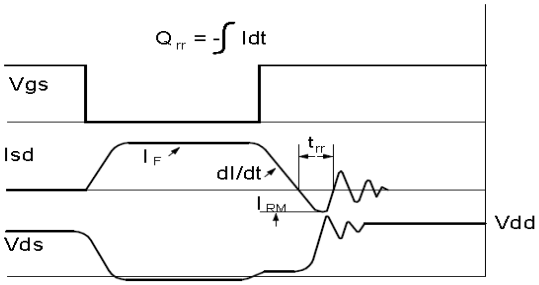
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms





PMOS Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	RthJC	-	-	5.9	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	RthJA	-	-	63	°C/W	40x40x1.6mm,2oz single copper FR-4 PCB

PMOS 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}	-40	-	-	V	V_{GS}=0V, I_D=-250uA
Gate threshold voltage	$V_{GS(th)}$	-1	-1.8	-2.5	V	V_{DS}=V_{GS},I_D=-250uA
Zero gate voltage drain current	I_{DSS}	- -	- -	-1 -100	μA	V_{DS}=-40V,V_{GS}=0V T_j=25°C T_j=100°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	34	50	mΩ	Vgs=-10V,Id=-7A
		-	46	60		Vgs=-4.5V,Id=-5A
Transconductance	g_{fs}	-	16	-	S	V_{DS}=-5V,I_D=-10A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	937	1499	pF	V_{GS}=0V, V_{DS}=-20V, f=1MHZ
Output Capacitance	C_{oss}	-	73	117		
Reverse Transfer Capacitance	C_{rss}	-	65	104		
Gate Total Charge	Q_G	-	20	32	nC	Vds=-20V,Id=-7A ,Vgs=-10V
Gate-Source charge	Q_{gs}	-	4	8		
Gate-Drain charge	Q_{gd}	-	4	8		
Turn-on delay time	$t_{d(on)}$	-	6	12	ns	V_{GS}=-10V, V_{DD}=-20V, R_{G_ext}=1.8Ω,I_D=-7A
Rise time	t_r	-	20	32		
Turn-off delay time	$t_{d(off)}$	-	27	43		
Fall time	t_f	-	5	10		
Gate resistance	R_G	0	6	12	Ω	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}=-7A
Body Diode Continuous Forward Current	Is	-	-	-14	A	TC = 25°C
Body Diode Pulsed Current	Is pulse	-	-	-54	A	TC = 25°C,tp=100us
Body Diode Reverse Recovery Time	t_{rr}	-	17	-	ns	I_F=-7A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	6	-	nC	

2)100% FT tested at VDS=30V, f=1MHz.

PMOS Typical Performance Characteristics

Fig 1: Output Characteristics

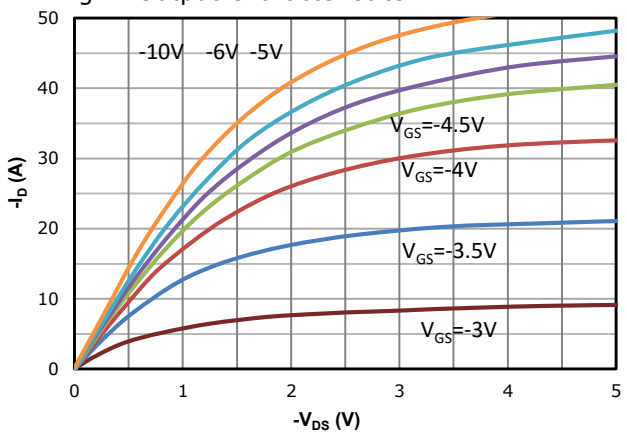


Fig 2: Transfer Characteristics

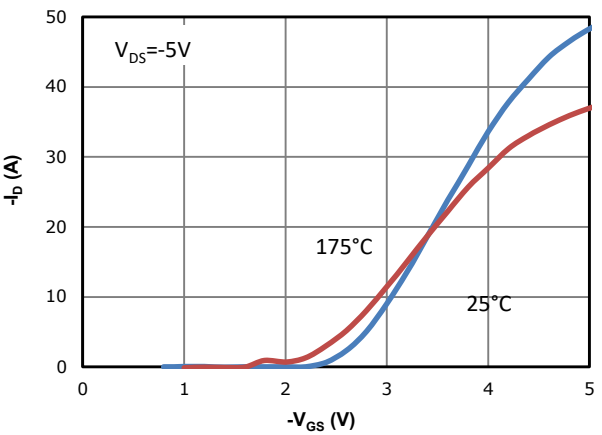


Fig 3: Rds(on) vs Drain Current and Gate Voltage

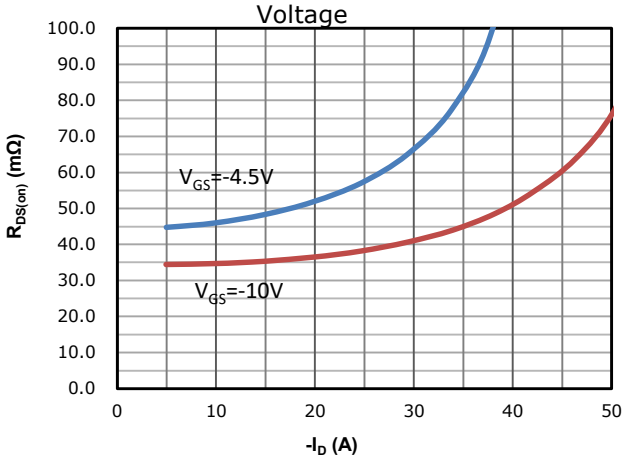


Fig 4: Rds(on) vs Gate Voltage

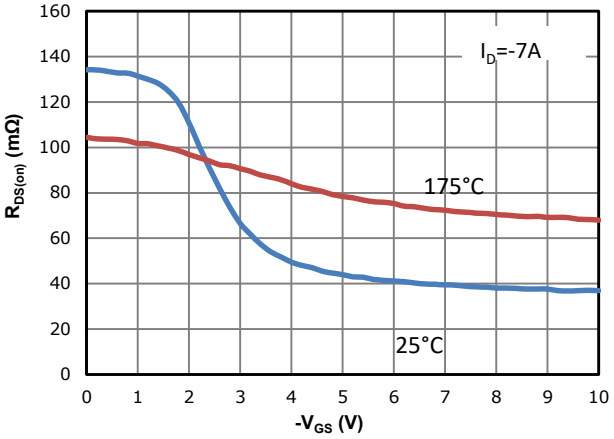


Fig 5: Rds(on) vs. Temperature

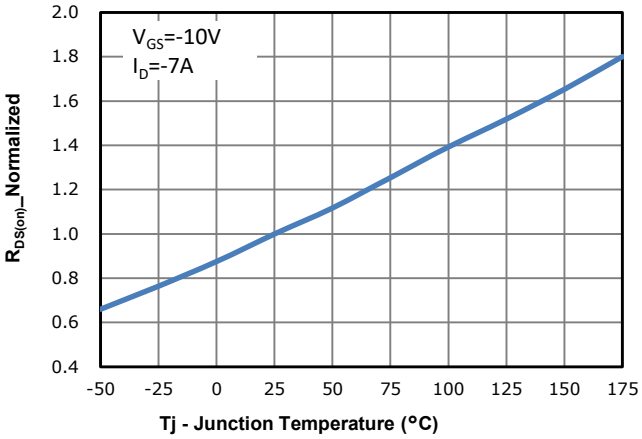


Fig 6: Vgs(th) vs. Temperature

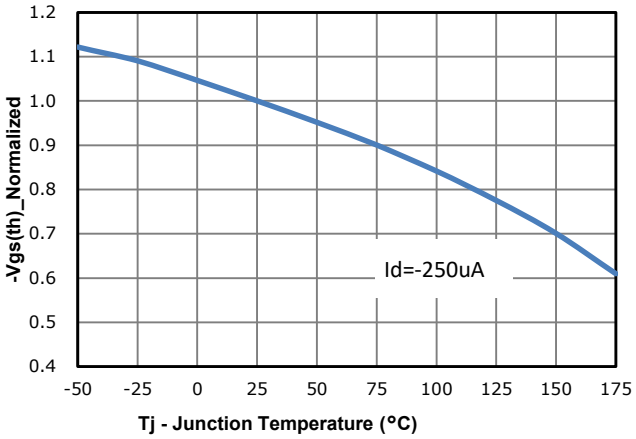


Fig 7: BVdss vs. Temperature

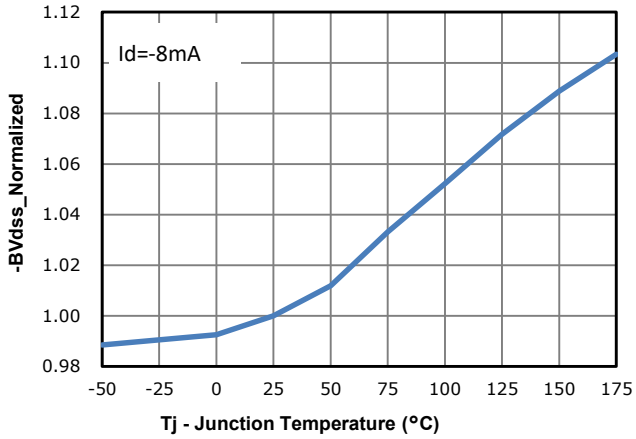


Fig 8: Capacitance Characteristics

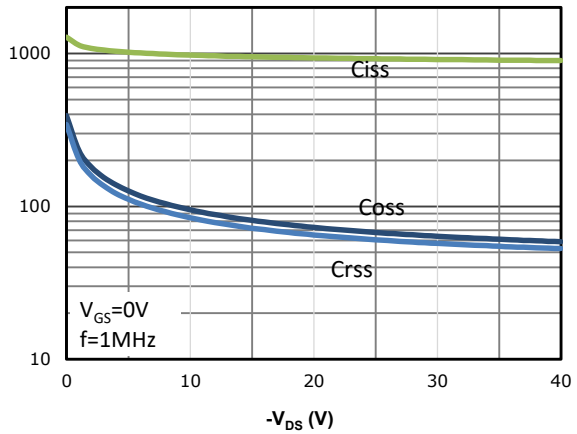


Fig 9: Gate ChargeCharacteristics

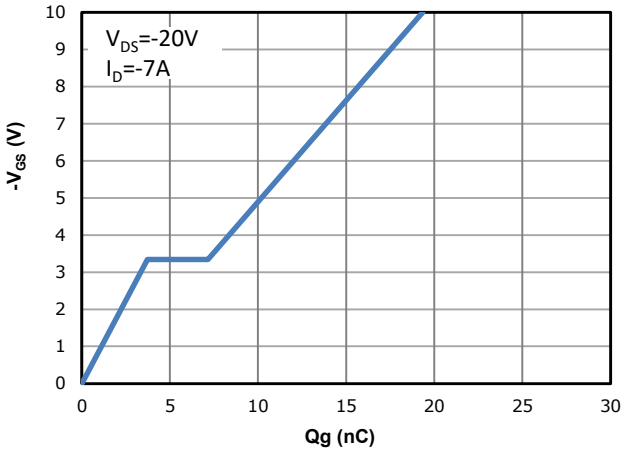


Fig 10: Body-diode Forward Characteristics

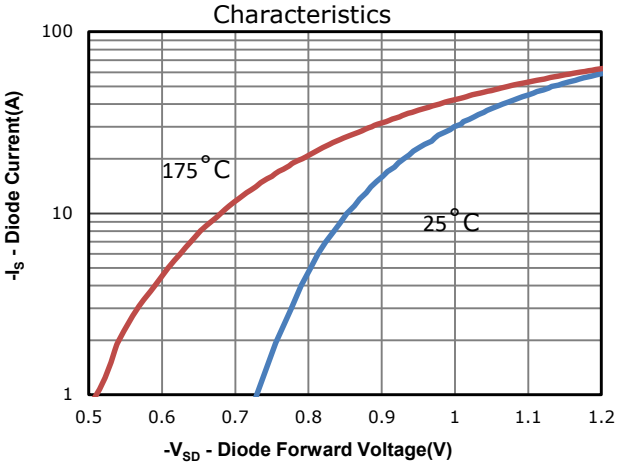


Fig 11: Power Dissipation

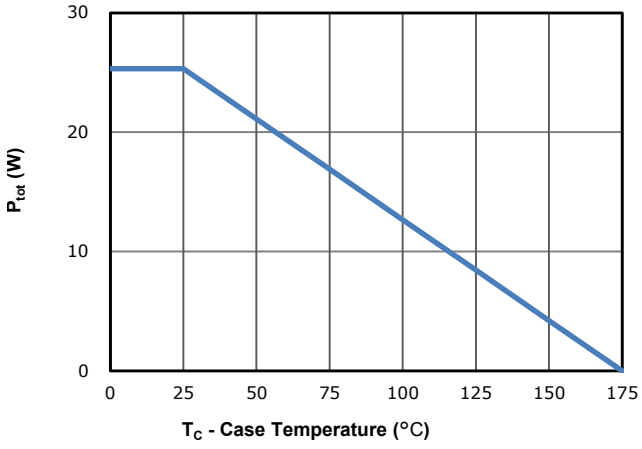


Fig 12: Drain Current Derating

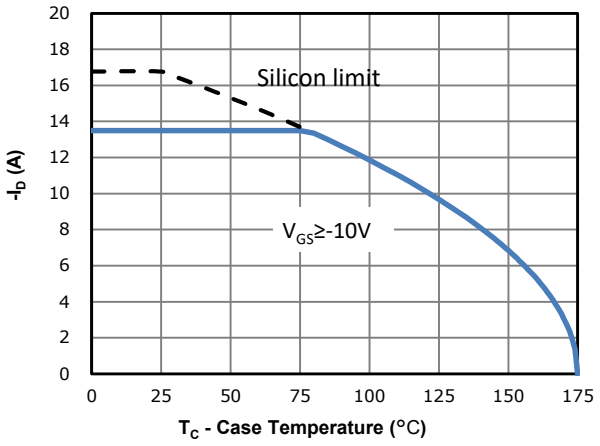


Fig 13: Safe Operating Area

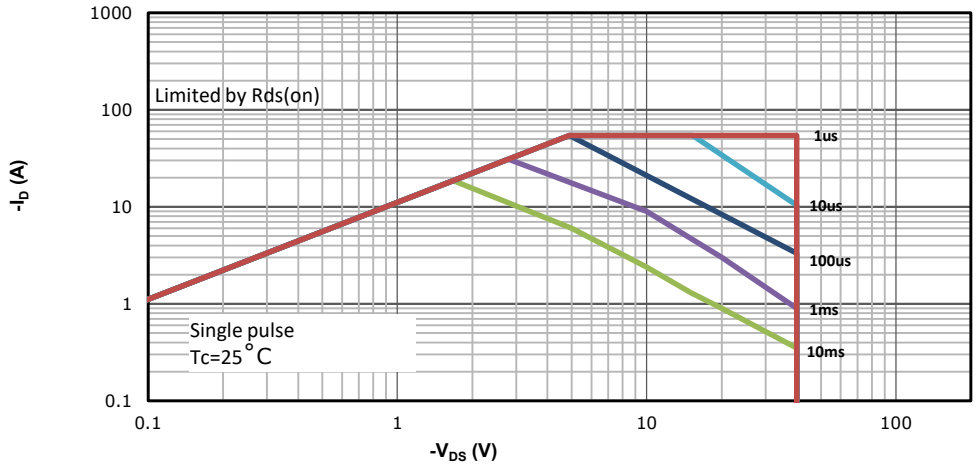
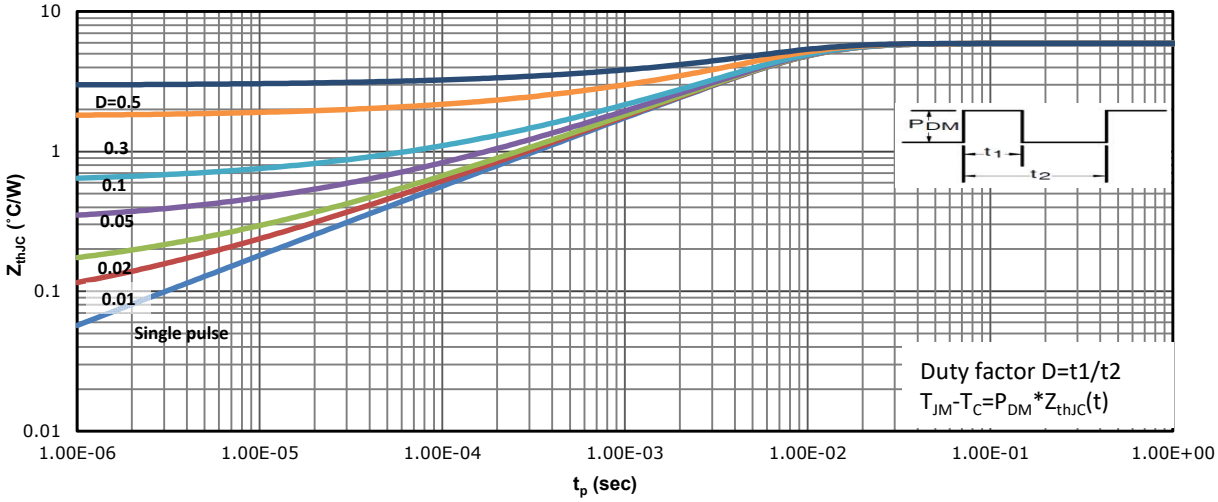
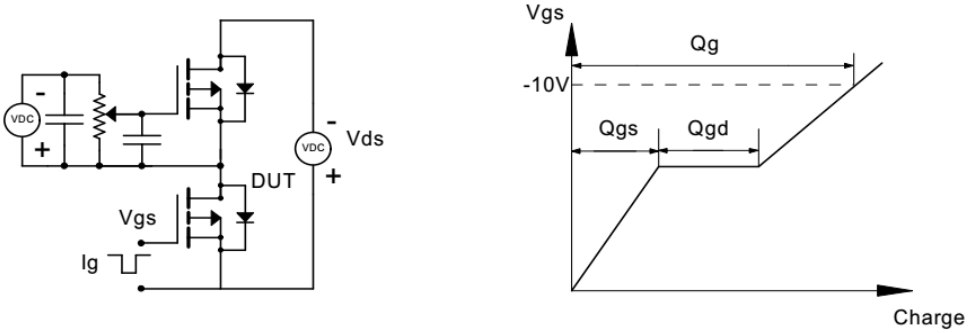


Fig 14: Max. Transient Thermal Impedance

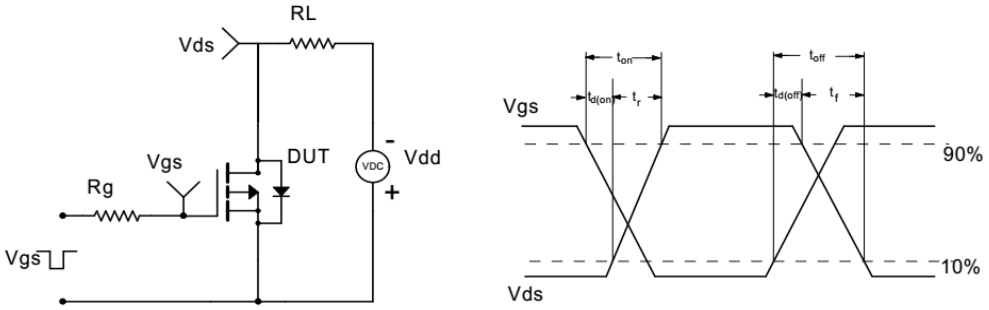


PMOS Test Circuit & Waveform

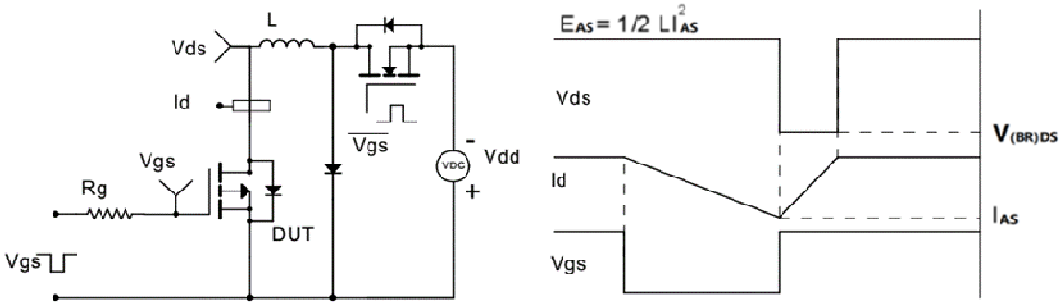
Gate Charge Test Circuit & Waveform



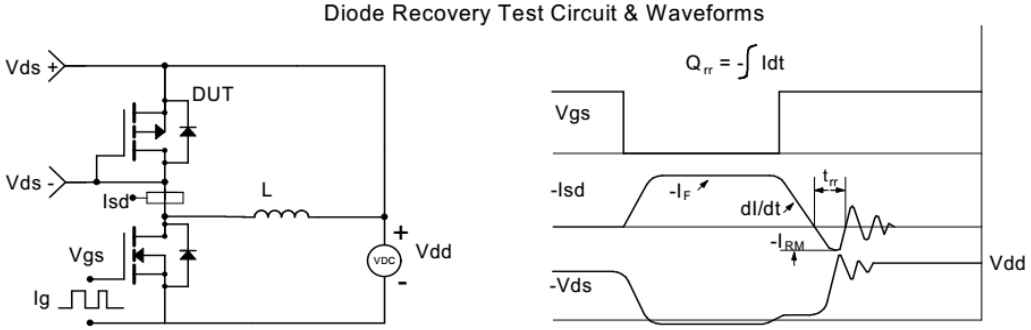
Resistive Switching Test Circuit & Waveforms



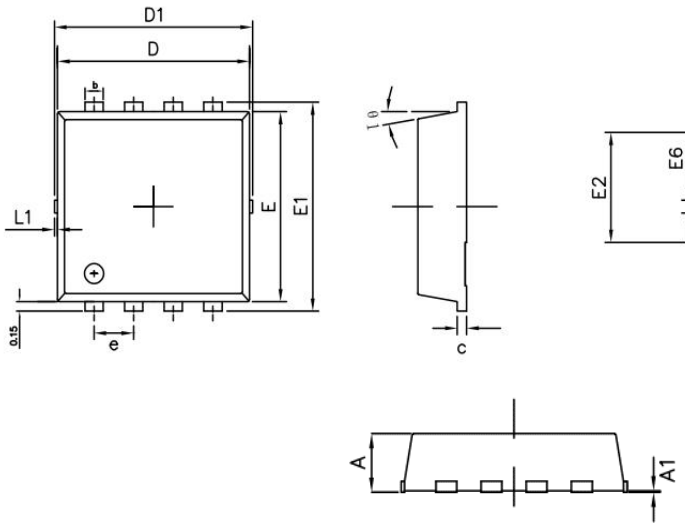
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: DFN3*3 双基岛



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.7	0.9	0.028	0.035
A1	0.005	0.05	0.000	0.002
b	0.24	0.35	0.009	0.014
c	0.1	0.25	0.004	0.010
D	3.0	3.25	0.118	0.128
D1	3.15	3.50	0.124	0.138
D2	0.3	0.5	0.012	0.020
D3	2.5	2.7	0.098	0.106
D4	2.35	2.55	0.093	0.100
E	2.9	3.1	0.114	0.122
E1	3.1	3.4	0.122	0.134
E2	1.65	1.85	0.065	0.073
E3	0.48	0.68	0.019	0.027
E4	0.23	0.43	0.009	0.017
E5	0.2	0.4	0.008	0.016
E6	0.075	0.15	0.003	0.006
e	0.6	0.7	0.024	0.028
K	0.52	0.75	0.020	0.030
L	0.3	0.5	0.012	0.020
L1	0	0.1	0.000	0.004
L2	0.33	0.53	0.013	0.021
L3	0.265	0.475	0.010	0.019
θ	0°	15°	0°	15°

Revision History

Revison	Date	Major changes
1.0	2026/1/7	Release of Formal Version.

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