JSBA4096

Single N-Ch 40V Fast Switching MOSFETs

Features

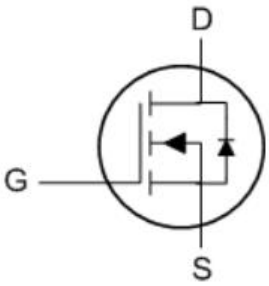
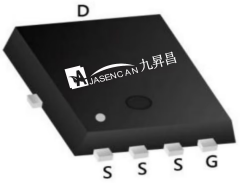
- Super Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced SGT technology

BVDSS		40	V
ID@VGS=10V , TC=25℃		162	A
RDSON(MAX)	VGS = 10 V , ID = 30 A	1.8	mΩ
	VGS = 4.5 V , ID = 20 A	2.6	

Description

The EHBA4096 is the high cell density trenched N-Ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The EHBA4096 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Equivalent Circuit	Outline
	**PRPAK5×6** 

Package Marking and Ordering Information

Device Marking	Date Code	Device Package	Quantity
A4096	YWWXXX	PRPAK5×6	5000 pcs

Thermal Characteristic

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	60	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case [1]	1.35	℃/W

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current, V_{GS} @ 10V [1] (T_C=25℃)	162	A
	Continuous Drain Current, V_{GS} @ 10V [1] (T_C=100℃)	103	
	Continuous Drain Current, V_{GS} @ 10V [1] (T_A=25℃)	24	
	Continuous Drain Current, V_{GS} @ 10V [1] (T_A=70℃)	19	
I_{DM}	Pulsed Drain Current [2]	600	A
P_D	Total Power Dissipation [4] (Tc=25℃)	92	W
	Total Power Dissipation [4] (Tc=100℃)	37	
	Total Power Dissipation [4] (T_A=25℃)	2.1	
	Total Power Dissipation [4] (T_A=70℃)	1.3	
E_{AS}	Single Pulse Avalanche Energy [3]	441	mJ
I_{AS}	Avalanche Current	42	A
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	℃

Electrical Characteristics (T_J=25℃ unless otherwise noted)

Static Characteristics						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V , I_D = 250 μA	40			V
$R_{DS(ON)}$	Drain-Source On-State Resistance [2]	V_{GS} = 10 V , I_D = 30 A		1.5	1.8	mΩ
		V_{GS} = 4.5 V , I_D = 20 A		2.0	2.6	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS} , I_D = 250 μA	1.2	1.5	2.5	V
I_{DSS}	Drain-Source Leakage Current (T_J=25℃)	V_{DS} = 40 V , V_{GS} = 0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20 V , V_{DS} = 0V			±100	nA
R_g	Gate Resistance	V_{DS} =0V, V_{GS} = 0V, f=1MHz		2.0		Ω

Dynamic Characteristics						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
C_{iss}	Input Capacitance	V_{DS} = 20 V V_{GS} = 0 V f=1.0MHz		3265		pF
C_{oss}	Output Capacitance			1583		pF
C_{rss}	Reverse Transfer Capacitance			64		pF
Switching Times						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 20 V V_{GS} = 10 V R_G = 2.0 Ω I_D = 30 A		19		nS
t_r	Turn-On Rise Time			10		nS
$t_{d(off)}$	Turn-Off Delay Time			60		nS
t_f	Turn-Off Fall Time			32		nS
Q_g	Total Gate Charge (10 V)	V_{DS} = 20 V V_{GS} = 10 V I_D = 30 A		64.3		nC
Q_{gs}	Gate-Source Charge			8.9		nC
Q_{gd}	Gate-Drain Charge			10.3		nC

Source-Drain Diode Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_S	Continuous Source Current [1,5]	V_G=V_D=0V, Force Current			162	A
V_{SD}	Diode Forward Voltage [2]	I_S = 30 A ,V_{GS}=0V , T_J=25℃			1.2	V
t_{rr}	Reverse Recovery Time	I_F = 30 A , dI/dt = 100A/μs, T_J=25℃		53		nS
Q_{rr}	Reverse Recovery Charge			70		nC

Notes:

1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2.The data tested by pulsed : Pulse Width ≤ 300μs , Duty Cycle ≤ 2%.

3.The E_{AS} data shows Max. rating . The test condition is V_{DD} = 25V , V_{GS} = 10V , L = 0.5mH , I_{AS} = 42 A.

4.The power dissipation is limited by 150℃ junction temperature.

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

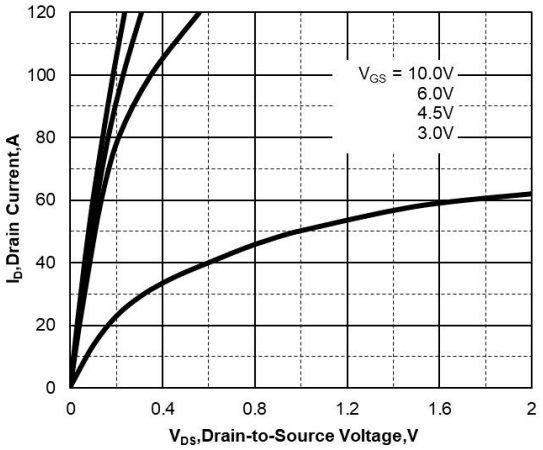


Fig.1 Typical Output Characteristics

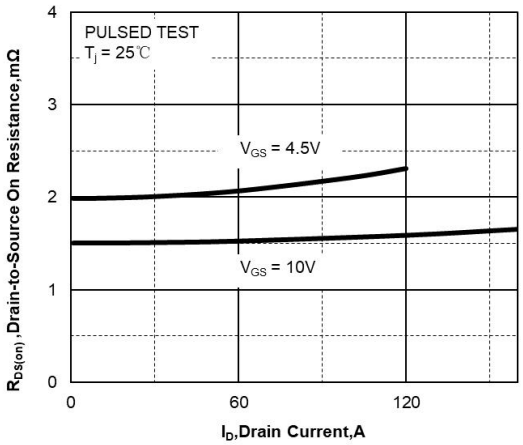


Fig.2 On-Resistance vs. G-S Voltage

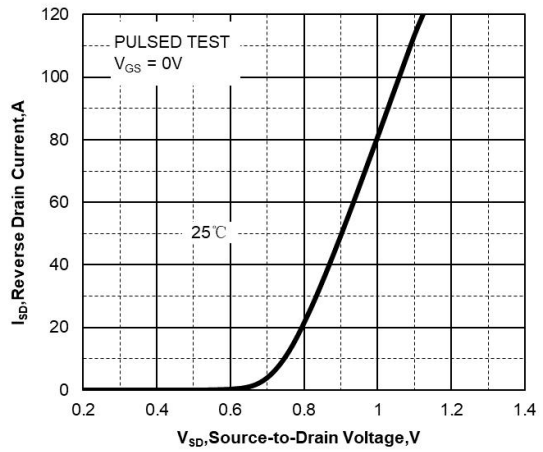


Fig.3 Forward Characteristics Of Reverse

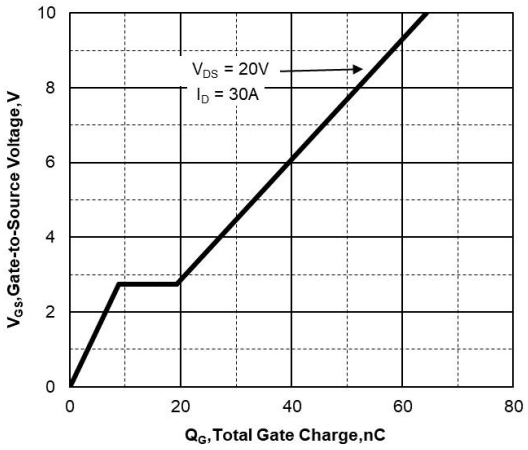


Fig.4 Gate-Charge Characteristics

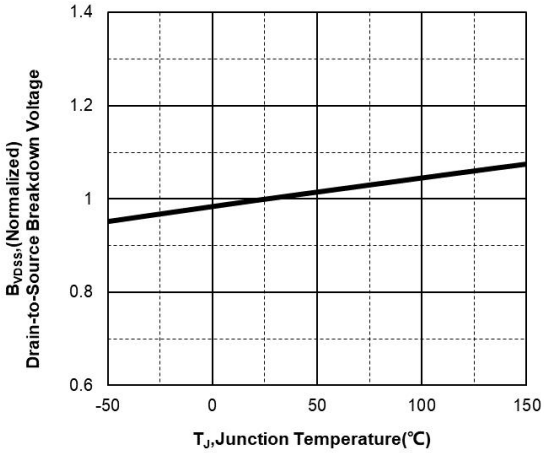


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

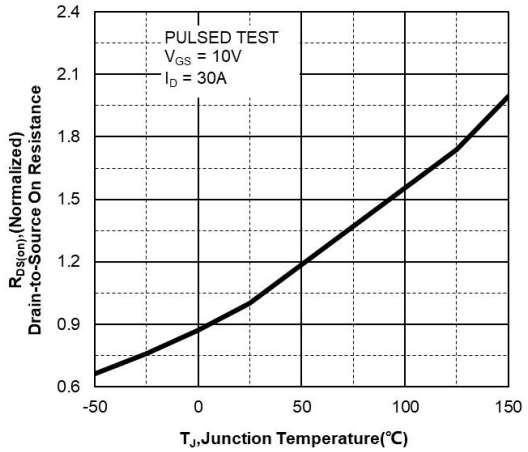


Fig.6 Normalized R_{DSON} vs. T_J

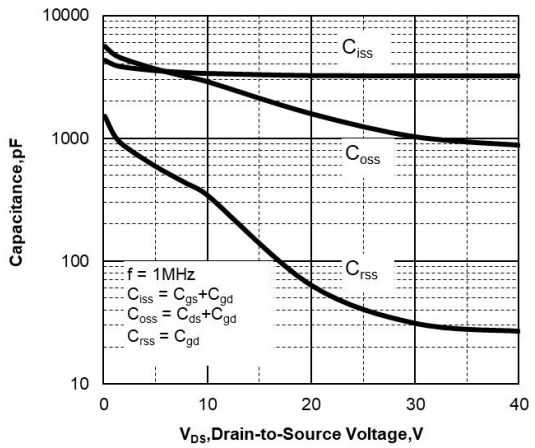


Fig.7 Capacitance

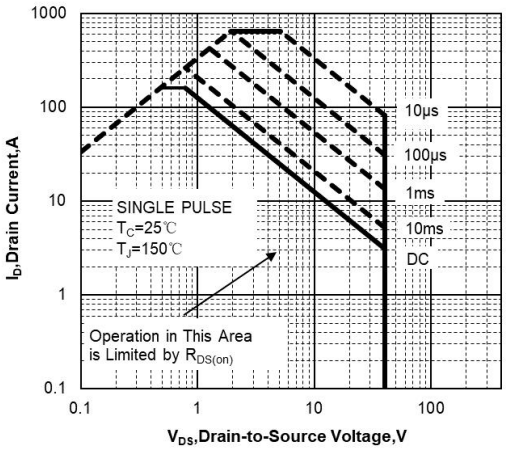


Fig.8 Safe Operating Area

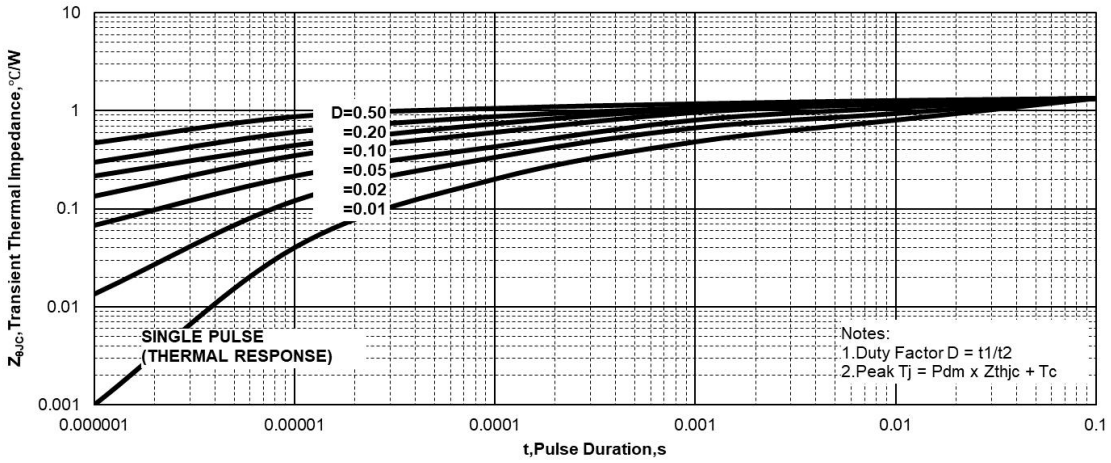


Fig.9 Normalized Maximum Transient Thermal Impedance

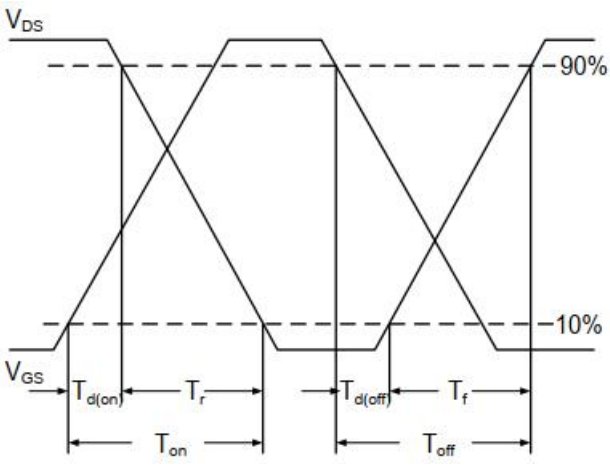


Fig.10 Switching Time Waveform

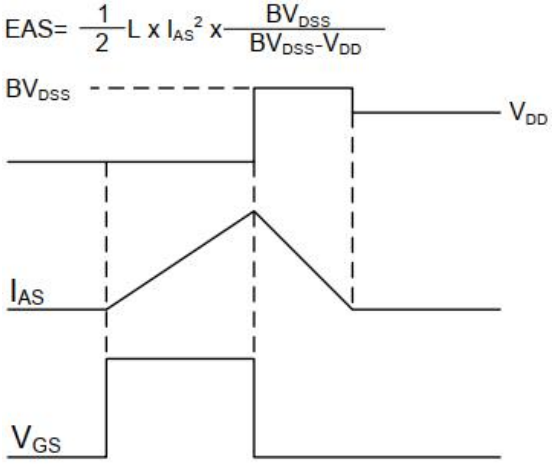
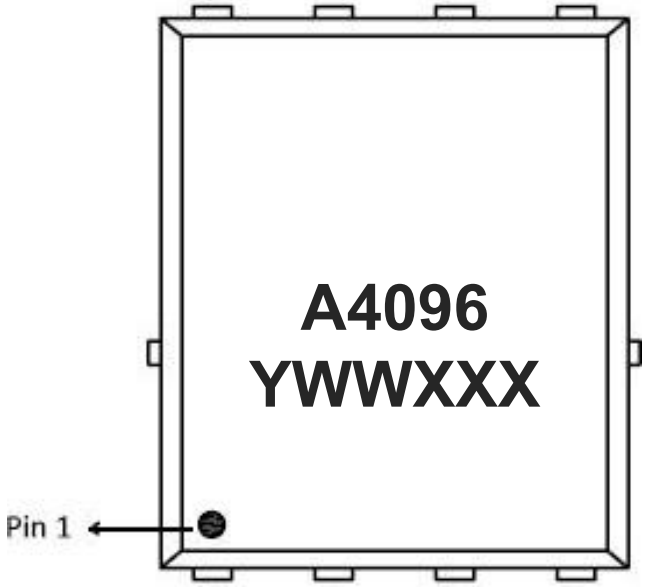


Fig.11 Unclamped Inductive Switching Waveform

Marking Information



1 st line： **HuaYuanWei Logo (left)**

2 nd line： **Device Package, Part Number, Channel and Version**

3 rd line： **Date Code [Y WW XX X]**

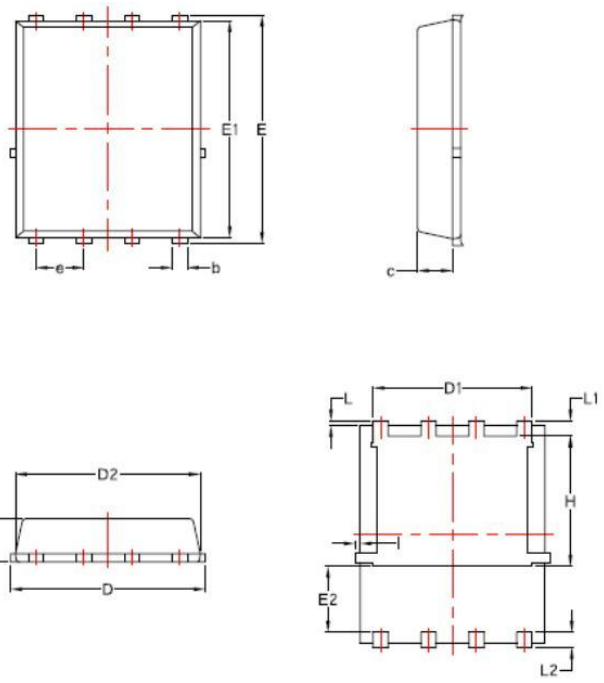
① **Y** **：** Year (2021=M, 2022=N……)

② **W W** **：** Week (01-53)

③ **X X** **：** Serial Number (01-99, AA-ZZ)

④ **X** **：** Factory Code (A-Z)

PRPAK5×6 Package Outline



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.20	0.0354	0.0474
b	0.30	0.51	0.0118	0.0200
c	0.60	1.046	0.0236	0.0412
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.20	0.1890	0.2047
E	5.90	6.35	0.2323	0.2500
E1	5.65	6.06	0.2224	0.2386
E2	1.10	-	0.0433	-
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.61	0.0150	0.0240
L2	0.30	0.71	0.0118	0.0280
H	3.30	3.92	0.1300	0.1543
I	-	0.18	-	0.0070