



Datasheet

X3G6516B5

Contents

- Features 1
- Description 1
- Static Parameters 2
- Switching Performance 3
- Thermal Characteristics 3
- Package Dimensions 7
- Gate Driving Examples 9
- Important Notice 11
- Applications 1
- Device Characteristics 2
- Dynamic Parameters 2
- Absolute **Max.** Ratings 3
- Characteristics Diagrams 4
- Testing Conditions 8
- Revision History 10

Features

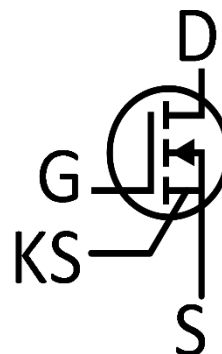
V_{DS}	$R_{DS(on)}$	I_{DS}
700V	150mΩ	13A

- High reliability
- High dv/dt capability
- Extremely low input capacitance
- Zero Qrr
- Outstanding switching performance
- Low system profile
- Double gate pins



Applications

- Switching power supplies
- PC and server power supplies
- Adapters, quick chargers
- 5G power supplies



Description

- The X3G6516B5 is a 700V power GaN HEMT in DFN5*6 package with dual gate pins. Based on p-GaN enhancement mode (E-mode) GaN-on-silicon technology, it is a normally off and stand-alone device. The device can be switched at very high frequencies in both soft-switching and hard-switching modes while still achieve high efficiency. In addition, our patented dual-gate-pin structure is designed to further improve switching performance and allow flexibility in PCB layout. Advanced packaging methods are implemented to obtain low thermal resistance and high device performance.

Type	Package	Qty
X3G6516B5	DFN5*6	4000

Device Characteristics

Static Parameters

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{GS(th)}$	Gate threshold voltage	1.2	1.6	2.3	V	$V_{DS}=V_{GS}$, $I_D=3.5mA$, $T_J=25^{\circ}C$
BV_{DSS}	Drain-Source breakdown voltage	700			V	$V_{GS}=0V$, $I_D=250\mu A$, $T_J=25^{\circ}C$
I_{DSS}	Drain-Source leakage current		1	100	μA	$V_{GS}=0V$, $V_{DS}=700V$, $T_J=25^{\circ}C$
			30		μA	$V_{GS}=0V$, $V_{DS}=700V$, $T_J=150^{\circ}C$
I_{GSS}	Gate-Source leakage current		20	300	μA	$V_{GS}=6V$, $V_{DS}=0V$, $T_J=25^{\circ}C$
				500	μA	$V_{GS}=6V$, $V_{DS}=0V$, $T_J=125^{\circ}C$
$R_{DS(on)}$	Static drain-source on resistance		150	195	mΩ	$V_{GS}=6V$, $I_D=5A$, $T_J=25^{\circ}C$
			360		mΩ	$V_{GS}=6V$, $I_D=5A$, $T_J=150^{\circ}C$
V_{SD}	Reverse conduction voltage	1	1.8	2	V	$I_{SD}=1A$, $V_{GS}=0V$, $T_J=25^{\circ}C$
R_G	Internal gate resistance		1.6		Ω	$f=5MHz$, open drain, $T_J=25^{\circ}C$

Dynamic Parameters

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input capacitance		62		pF	$V_{GS}=0V$, $V_{DS}=400V$, $f=1MHz$ $T_J=25^{\circ}C$
C_{oss}	Output capacitance		20		pF	
C_{rss}	Reverse transfer capacitance		0.8		pF	
Q_g	Gate charge		1.6		nC	$V_{DS}=400V$, $I_D=6A$, $V_{GS}=6V$ $T_J=25^{\circ}C$
Q_{gs}	Gate to source charge		0.4		nC	
Q_{gd}	Gate to drain charge		0.4		nC	
Q_{rr}	Reverse recovery charge		0		nC	
DR_2/DR_1	Dynamic resistance ratio			1.1	-	$V_{DS}=400V$, $T_J=25^{\circ}C$

Switching Performance

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on delay time		0.6		ns	$V_{DS}=400V$, $I_D=6A$ $V_{GS}=+6V/0V$ $R_{g(on)}=15\Omega$, $R_{g(off)}=3\Omega$ $L=70\mu H$ $T_J=25^\circ C$
t_r	Rise time		1.4		ns	
$t_{d(off)}$	Turn-off delay time		1.9		ns	
t_f	Fall time		6		ns	
E_{on}	Turn on switching energy		9.4		μJ	
E_{off}	Turn off switching energy		2.1		μJ	

Absolute Max. Ratings

Symbol	Parameter	Value	Unit
V_{DS-max}	Breakdown voltage transient @ $T_J=25^\circ C$	850	V
V_{GS-max}	Gate to source max. transient voltage @ $T_J=25^\circ C$	-15 to 7	V
I_{DS-max}	Gate to source DC current @ $T_C=25^\circ C$	13	A
I_{DS-max}	Gate to source DC current @ $T_C=100^\circ C$	8	A
$I_{DS \text{ Pulse-max}}$	Pulse drain current(Pulse width 50 μs , $V_{GS}=6V$)	21	A
$dv/dt-max$	Drain to source voltage slew rate	150	V/ns
T_{J-max}	Max junction temperature	150	$^\circ C$
T_{S-max}	Storage temperature	-55 to 150	$^\circ C$

Thermal Characteristics (Typical)

Symbol	Parameter	Typ.	Max.	Unit
R_{thJC}	Thermal resistance from junction to case	1.6		$^\circ C/W$
R_{thJA}	Thermal resistance from junction to ambient		58	
T_{solder}	Reflow soldering temperature	260		$^\circ C$

Characteristics Diagrams

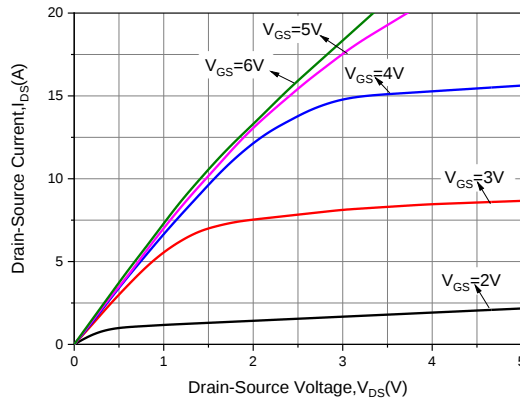


Figure 1. Output Characteristics $T_j=25^\circ\text{C}$

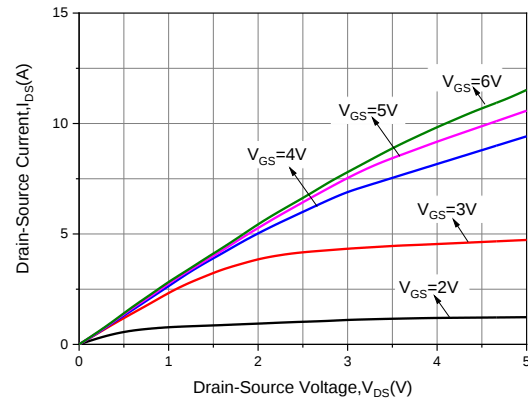


Figure 2. Output Characteristics $T_j=150^\circ\text{C}$

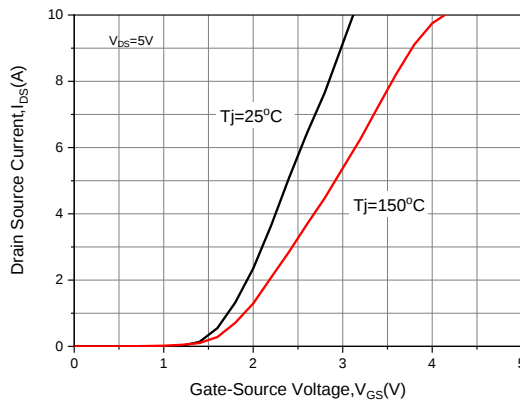


Figure 3. Transfer Characteristic for Various Junction Temperature

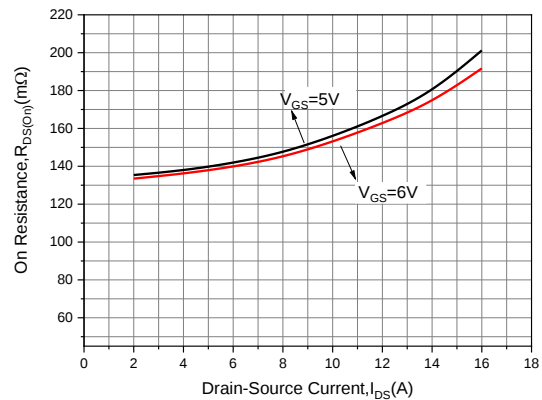


Figure 4. On-resistance vs. Drain Current for Various Gate Voltage @25°C

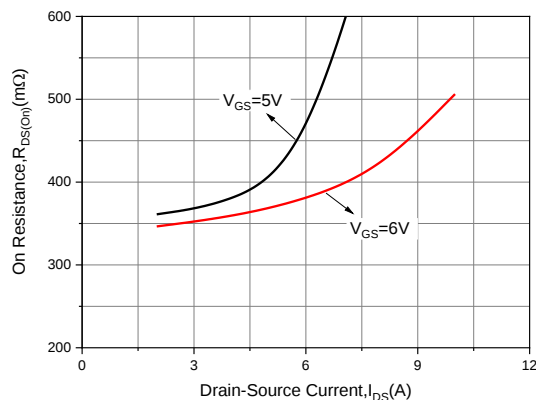


Figure 5. On-resistance vs. Temperature for Various Gate Voltage @150°C

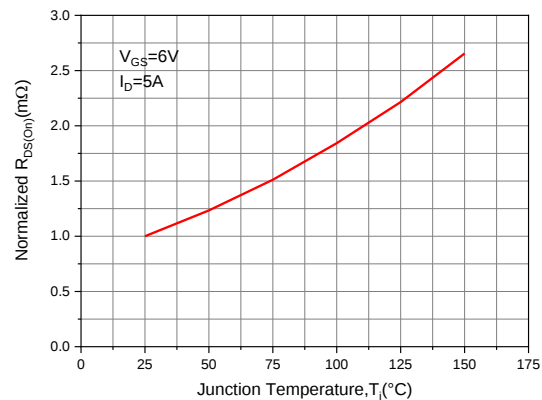


Figure 6. On-Resistance vs. Temperature

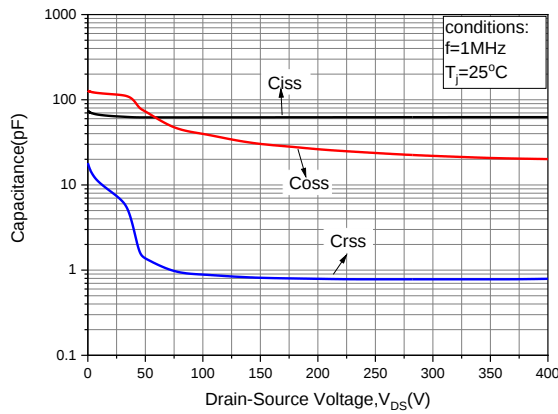


Figure 7. Capacitances vs. Drain-Source Voltage

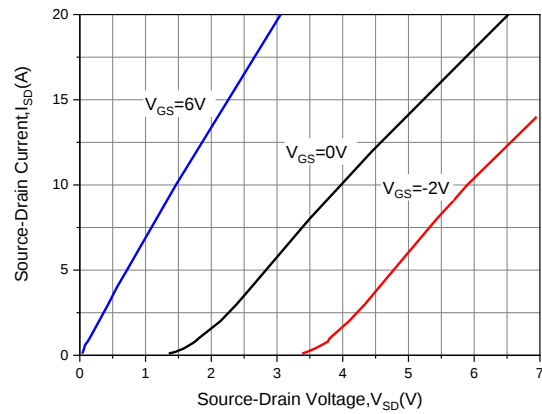


Figure 8. Channel Reverse Characteristic

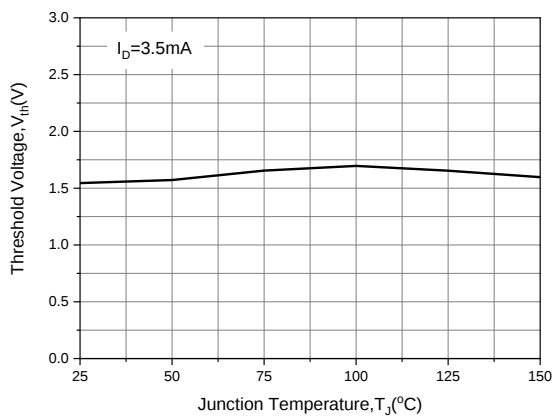


Figure 9. Threshold Voltage vs. Temperature

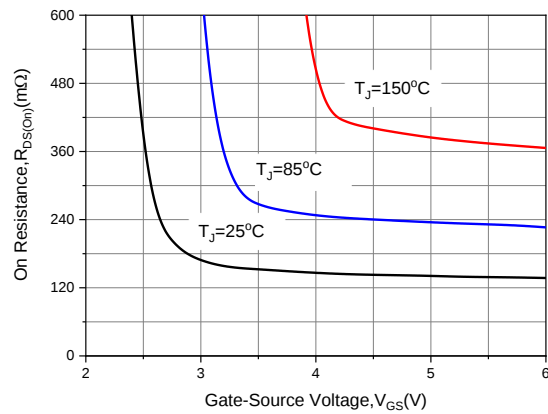


Figure 10. On-resistance vs. Gate Voltage @5A

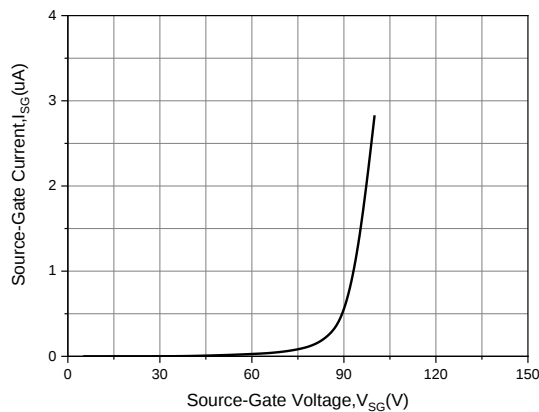


Figure 11. Reverse Gate Voltage

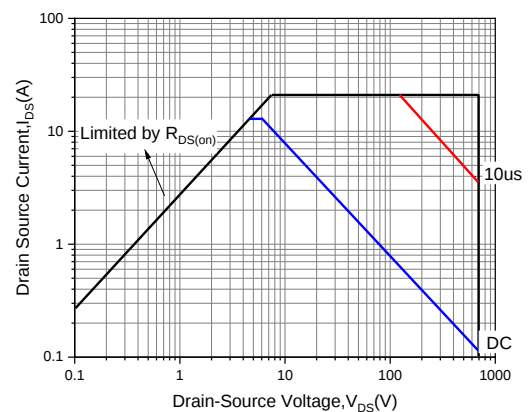


Figure 12. Safe Operating Area

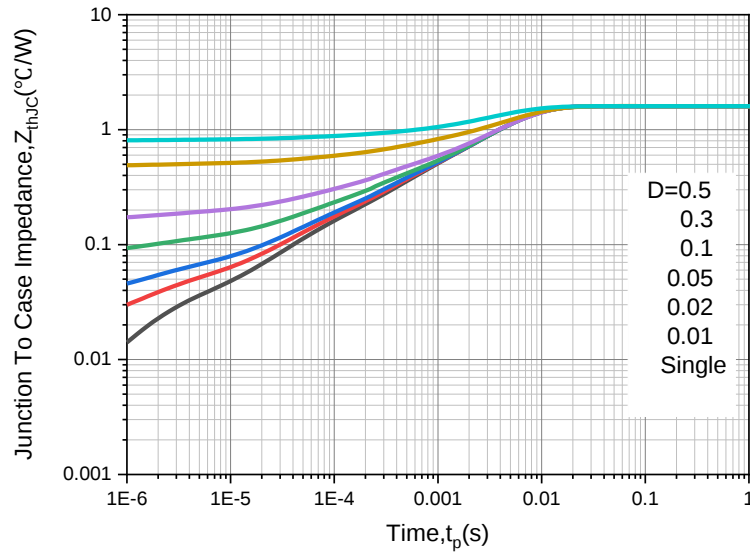
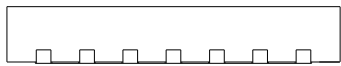
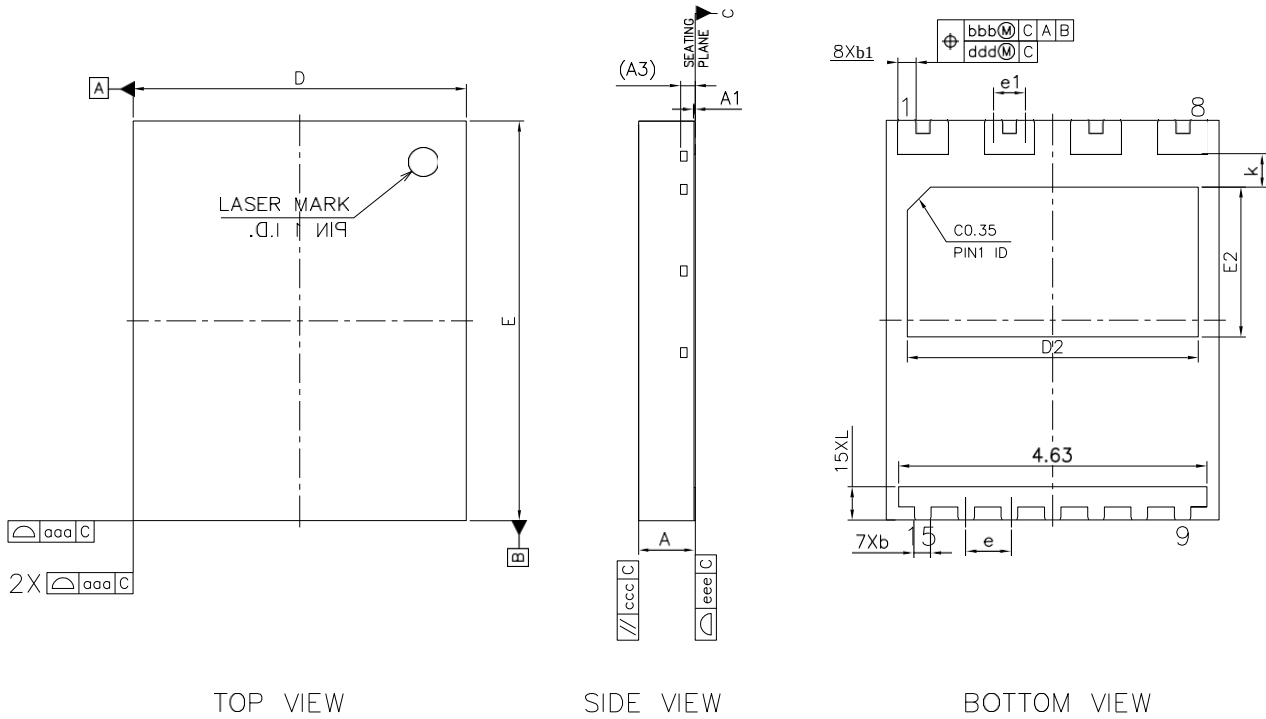


Figure 13. Transient Thermal Impedance (Junction-Case)

Package Dimensions

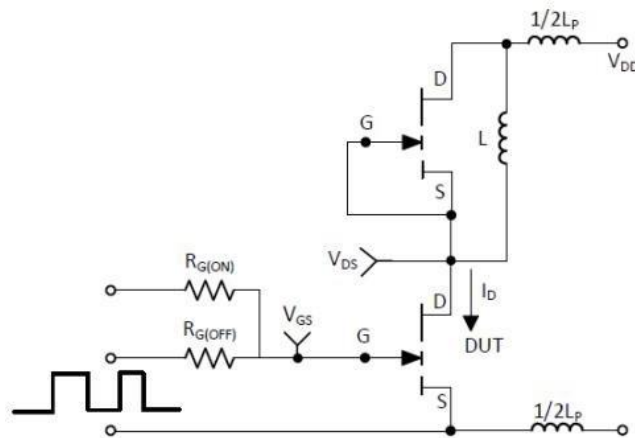


SIDE VIEW

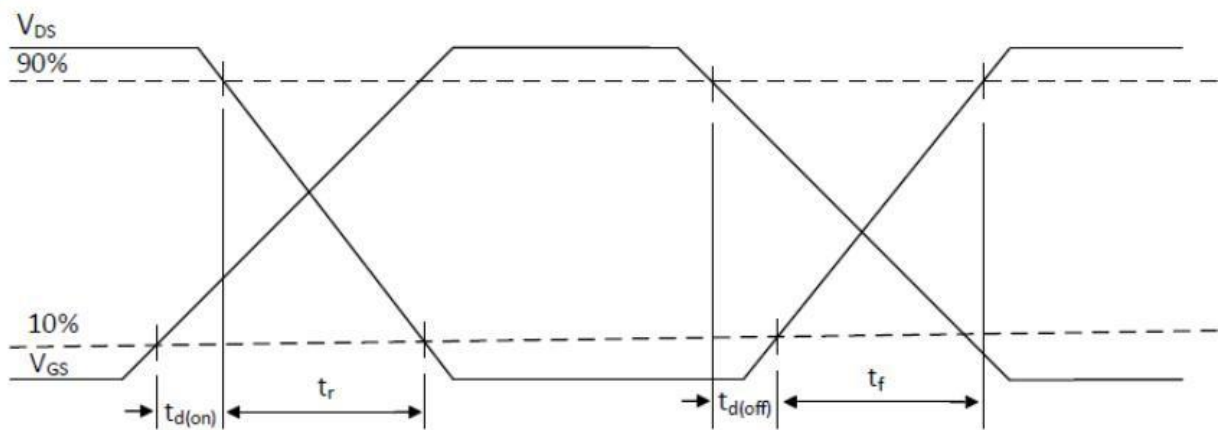
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0.00	0.02	0.05
A3	0.20REF		
b	0.20	0.25	0.30
b1	0.225	0.275	0.325
D	5.00 BSC		
E	6.00 BSC		
e	0.65 BSC		
e1	0.475 BSC		
D2	4.27	4.37	4.47
E2	2.15	2.25	2.35
K	0.20		
L	0.40	0.50	0.60
aaa	0.05		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.08		

Testing Conditions

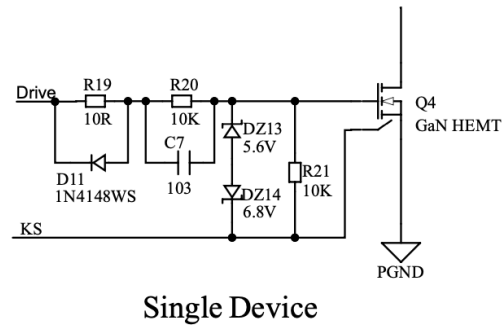
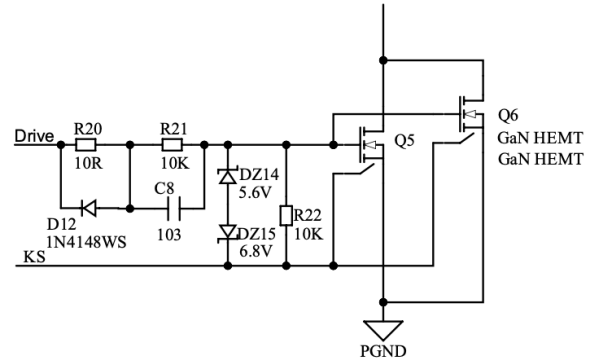
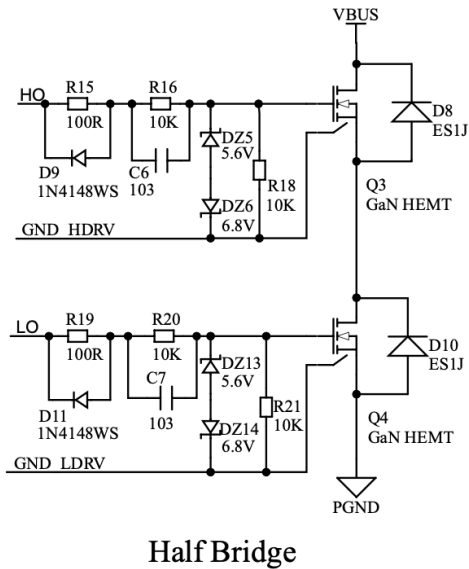


Switching Test Circuit



Switching Time Waveform

Gate Driving Examples



Revision History

Document revision	Date	Description of changes
1.0	2024.5.10	Target datasheet
1.1	2025.3.6	Revise Vth



X3G6516B5

700V 150mΩ E-Mode GaN HEMT

Important Notice

The information provided in this document is for informational purposes only and should not be construed as a warranty of condition, character, or performance under any circumstances. Xienergy disclaims any liability arising from the application or use of any of the products described herein, including but not limited to any personal injury, death, or damage to property or the environment. No license, patent or any other intellectual property rights are granted or transferred. Xienergy reserves the right to amend without prior notice. All rights reserved.

Questions?

Email: info@xienergy.com

Web: www.xienergy.com

Tel: 1-778.588.1119

Copyright © 2024

Xienergy Systems, Inc.

Vancouver, Canada