



Datasheet

X3G6515A8

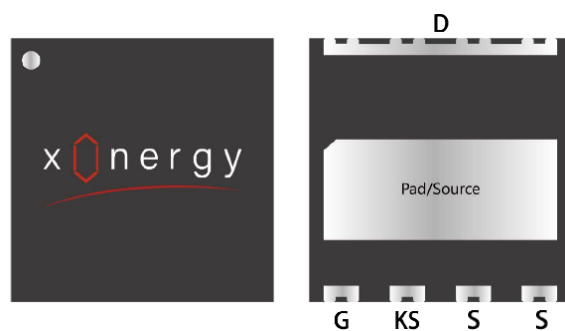
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Features

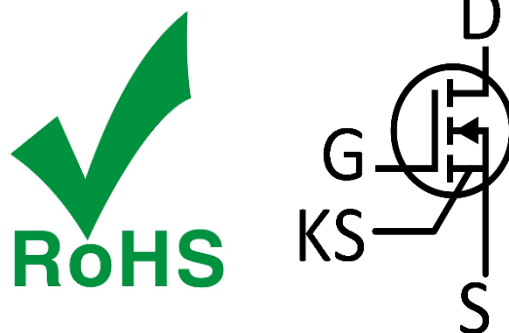
V_{DS}	$R_{DS(on)}$	I_{DS}
700V	150mΩ	13A

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



Applications

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



Description

- The X3G6515A8 is a 700V power GaN HEMT in DFN8*8 package. 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, advanced packaging methods are implemented to obtain low thermal resistance and high device performance.

Type	Package	Qty
X3G6515A8	DFN8*8	3300

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	190	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
$I_{DS\ Pulse-max}$	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

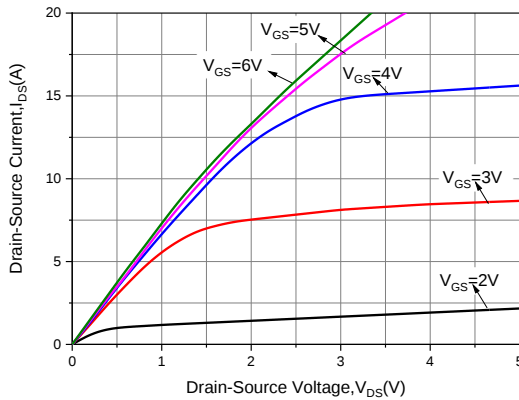


Figure 1. Output Characteristics $T_j=25^\circ\text{C}$

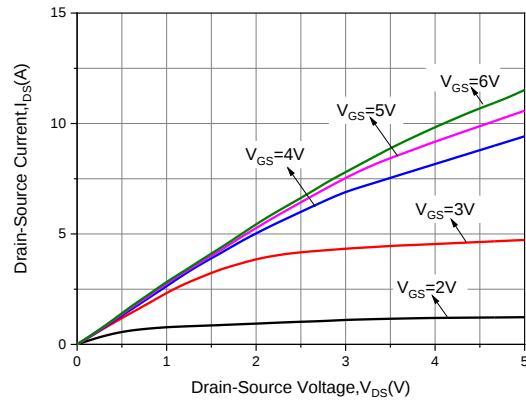


Figure 2. Output Characteristics $T_j=150^\circ\text{C}$

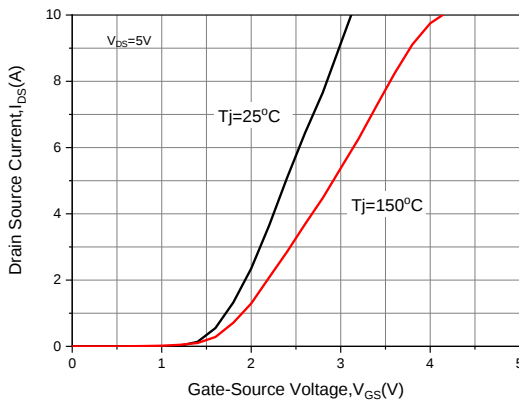


Figure 3. Transfer Characteristic for Various Junction Temperature

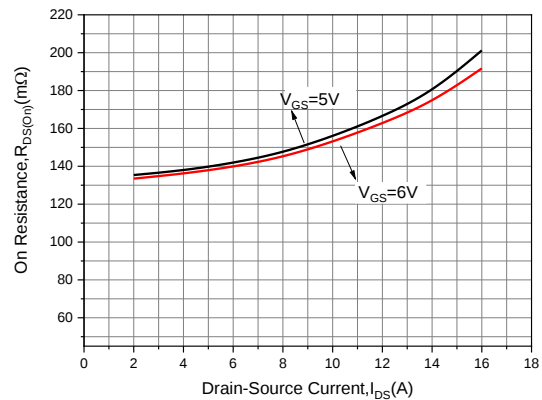


Figure 4. On-resistance vs. Drain Current for Various Gate Voltage @25°C

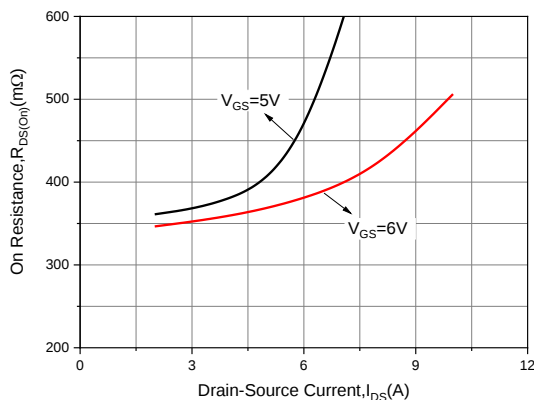


Figure 5. On-resistance vs. Temperature for Various Gate Voltage @150°C

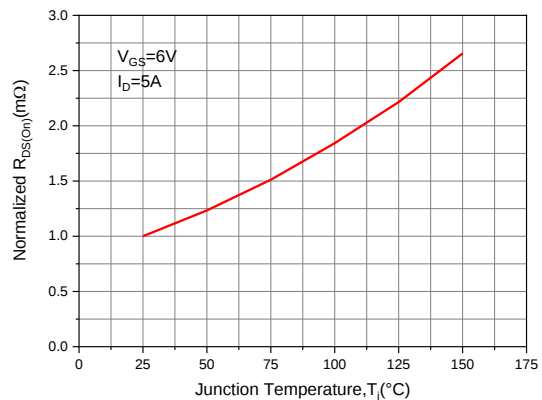


Figure 6. On-Resistance vs. Temperature

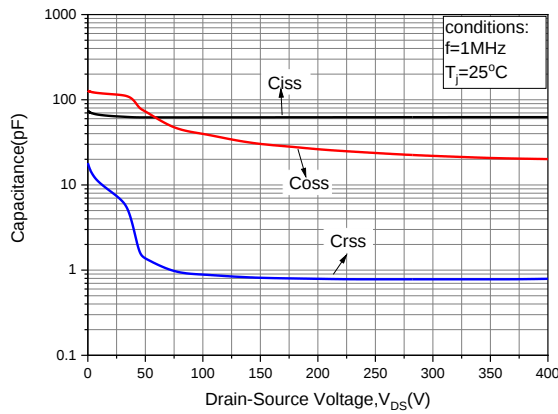


Figure 7. Capacitances vs. Drain-Source Voltage

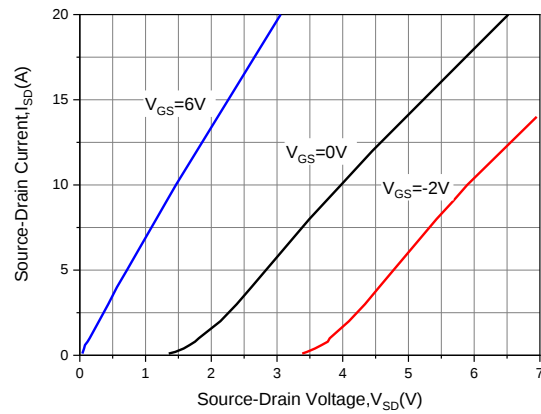


Figure 8. Channel Reverse Characteristic

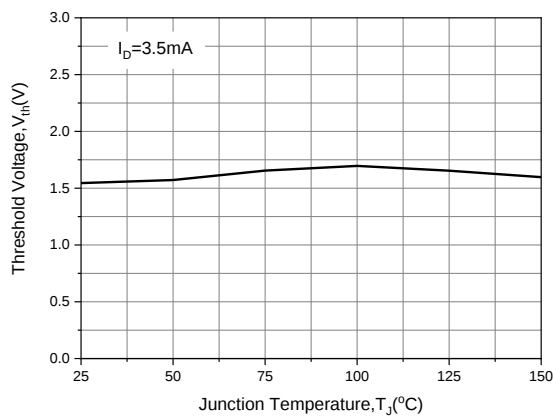


Figure 9. Threshold Voltage vs. Temperature

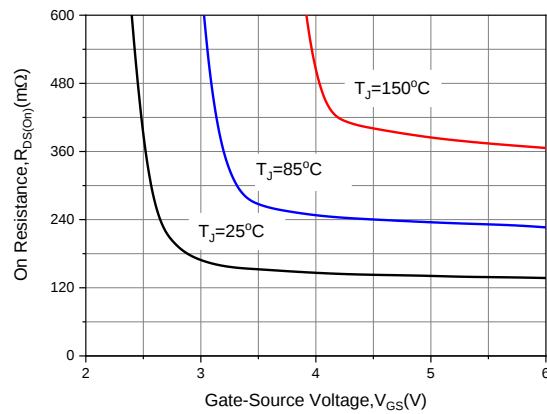


Figure 10. On-resistance vs. Gate Voltage @5A

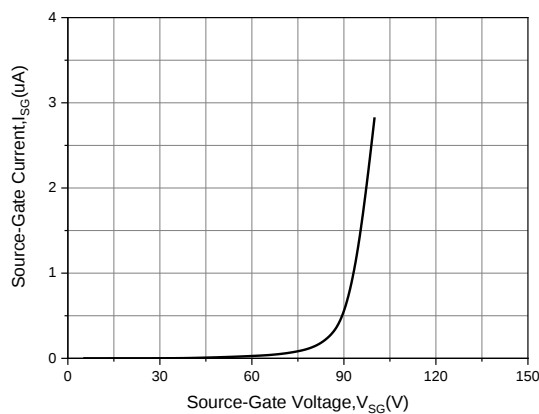


Figure 11. Reverse Gate Voltage

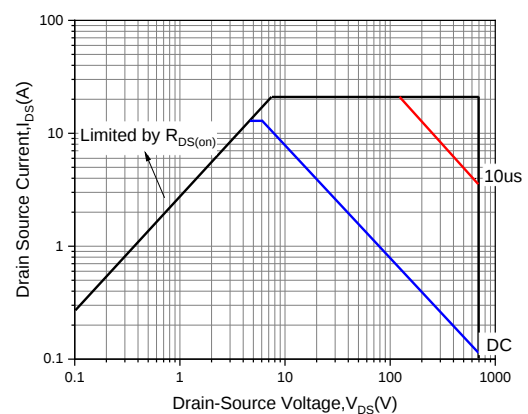


Figure 12. Safe Operating Area

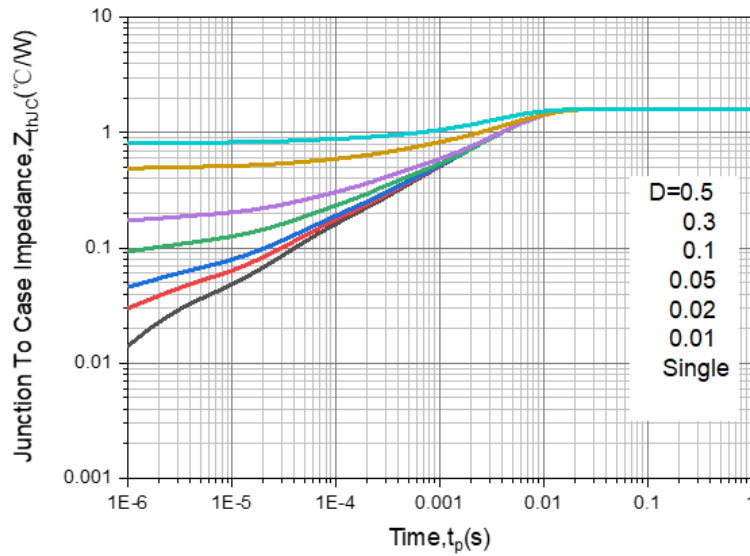
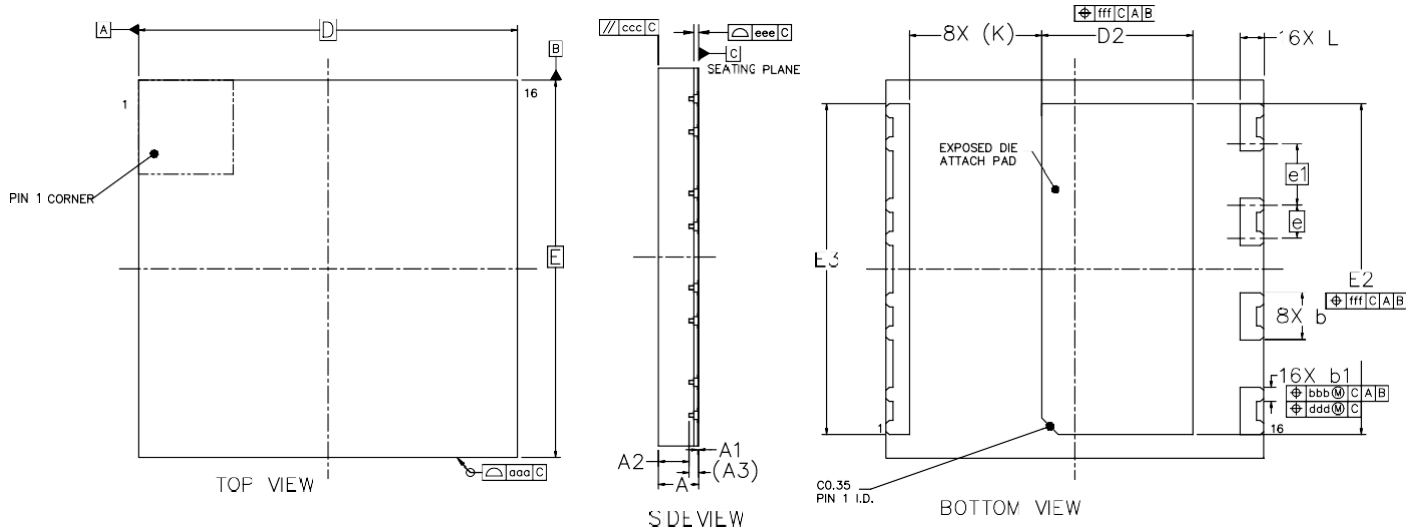


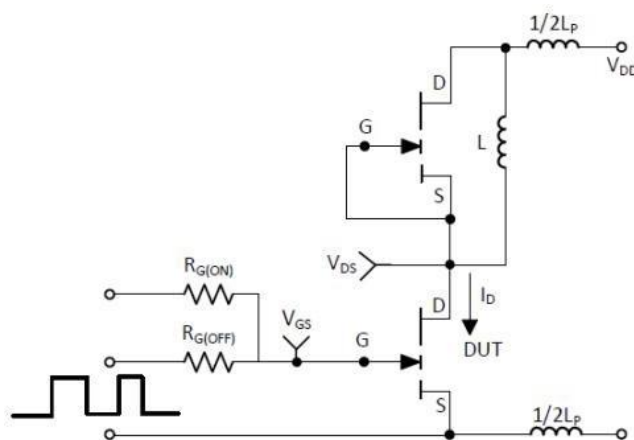
Figure 13. Transient Thermal Impedance (Junction-Case)

Package Dimensions

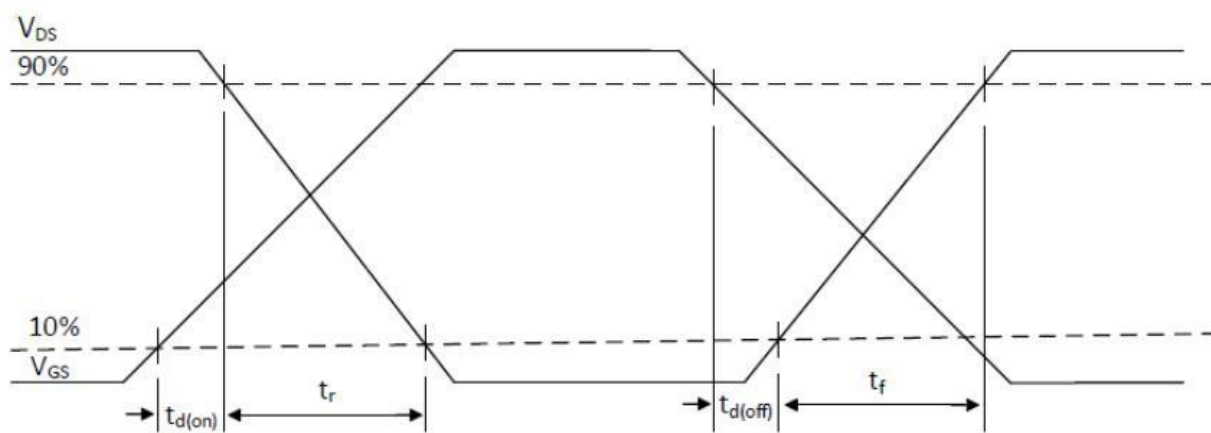


		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.80	0.85	0.90
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.647	---
L/F THICKNESS		A3	0.203		
LEAD WIDTH		b	0.90	1.00	1.10
		b1	0.25	0.30	0.35
BODY SIZE	X	D	8 BSC		
	Y	E	8 BSC		
LEAD PITCH		e	0.7 BSC		
		e1	1.3 BSC		
EP SIZE	X	D2	3.10	3.20	3.30
	Y	E2	6.90	7.00	7.10
	Y	E3	6.90	7.00	7.10
LEAD LENGTH		L	0.40	0.50	0.60
LEAD TIP TO EXPOSED PAD EDGE		K	2.8 REF		
PACKAGE EDGE TOLERANCE		aaa	0.1		
MOLD FLATNESS		ccc	0.1		
COPLANARITY		eee	0.08		
LEAD OFFSET		bbb	0.1		
		ddd	0.05		
EXPOSED PAD OFFSET		fff	0.1		

Testing Conditions

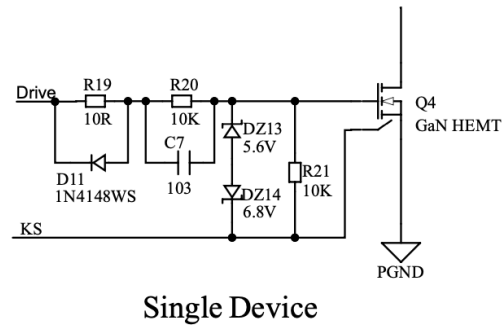
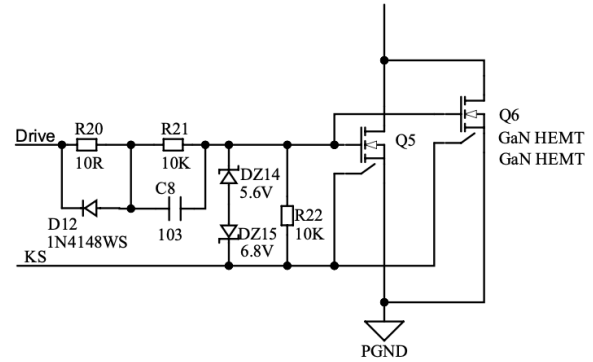
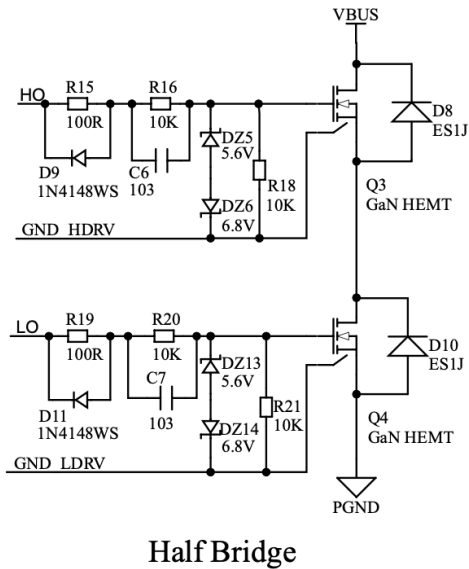


Switching Test Circuit



Switching Time Waveform

Gate Driving Examples



Revision History

Document revision	Date	Description of changes
1.0	2025.2.14	Target datasheet
1.1	2025.3.6	Revise Vth



X3G6515A8

700V 150mΩ E-Mode GaN HEMT

Important Notice

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