

650V GaN HEMT

Description

The CC65H270TOBI Series 650V, 270mΩ gallium nitride (GaN) FETs are normally-off devices.

Classicchip GaN FETs offer better efficiency through lower gate charge, faster switching speeds, and lower dynamic onresistance, delivering significant advantages over traditional silicon (Si) devices.

Classicchip is a leading-edge wide band gap supplier with world-class innovation .

Automotive

- Adapter
- Renewable energy
- Telecom and data-com
- Servo motors
- Industrial
- Automotive

General Features

Easy to drive—compatible with standard gate drivers

Low conduction and switching losses

RoHS compliant and Halogen-free

Benefits

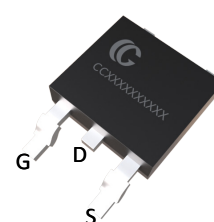
Increased efficiency through fast switching

Increased power density

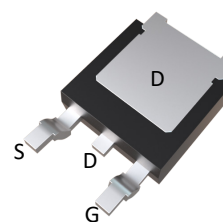
Reduced system size and weight

Ordering Information

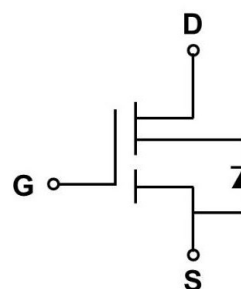
Part Number	Package	Package Configuration
CC65H270TOBI	TO252	Drain



Top



Bottom



Circuit Symbol

Features

BV_{DSS}	$R_{DS(ON)}$	I_{DS}	Q_G
650V	270mΩ	11A	8.7nC

Absolute Maximum Ratings

$T_c=25^\circ\text{C}$ unless otherwise stated

Symbol	Parameter		Limit value	Unit
V_{DSS}	Drain to source voltage ($T_J = -55^\circ\text{C}$ to 150°C)		650	
$V_{(TR)DSS}$	Drain to source voltage-transient ^a		800	V
V_{GSS}	Gate to source voltage		-20 ~ +20	
I_D	Continuous drain current @ $T_c=25^\circ\text{C}$ ^b		11	A
	Continuous drain current @ $T_c=125^\circ\text{C}$ ^b		5	
I_{DM}	Pulse drain current (pulse width: 100 μs)		15	A
P_D	Maximum power dissipation @ $T_c=25^\circ\text{C}$		62	W
T_c	Operating temperature	Case	-55 ~ 150	$^\circ\text{C}$
T_J		Junction	-55 ~ 150	$^\circ\text{C}$
T_S	Storage temperature		-55 ~ 150	$^\circ\text{C}$

a. In off-state, spike duty cycle $D < 0.01$, spike duration $< 1\mu\text{s}$

b. For increased stability at high current operation

Thermal Resistance

Symbol	Parameter	Limit value	Unit
$R_{\theta JC}$	Junction-to-case	2	°C /W

Electrical Parameters

T_J=25°C unless otherwise stated

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
Forward Device Characteristics						
V _{(BL)DSS}	Drain-source voltage	650	-	-	V	V _{GS} = 0V
V _{GS(th)}	Gate threshold voltage	3.3	3.9	4.5	V	V _{DS} =1V, I _{DS} =1mA
ΔV _{GS(th)} /T _J	Gate threshold voltage temperature coefficient	-	-7	-	mV/°C	
R _{DS(on)}	Drain-source on-Resistance	-	270	320	mΩ	V _{GS} =10V, I _D =1A, T _J =25°C
		-	570	-		V _{GS} =10V, I _D =1A, T _J =150°C
I _{DSS}	Drain-to-source leakage current	-	-	10	μA	V _{DS} =650V, V _{GS} = 0V, T _J =25°C
		-	-	100		V _{DS} =650V, V _{GS} = 0V, T _J =150°C
I _{GSS}	Gate-to-source forward leakage current	-	-	±100	nA	V _{GS} =±20V
C _{ISS}	Input capacitance	-	333	-	pF	V _{GS} =0V, V _{DS} =400V, f=1MHz
C _{OSS}	Output capacitance	-	18	-		
C _{RSS}	Reverse capacitance	-	3.74	-		
Q _G	Total gate charge	-	8.7	-	nC	V _{DS} =400V, V _{GS} =0V to 10V, I _D =1A
Q _{GS}	Gate-source charge	-	2.2	-		
Q _{GD}	Gate-drain charge	-	2.6	-		
Q _{OSS}	Output charge	-	24	-	nC	V _{GS} =0V, V _{DS} =0V to 400V, f=1MHz
t _{D(on)}	Turn-on delay	-	3.2	-	ns	V _{DS} =400V, V _{GS} =0V to 10V, I _D =2.1A, R _{G-on(ext)} =6.8Ω, R _{G-off(ext)} =2.2Ω, L=250μH
t _R	Rise time	-	5.5	-		
t _{D(off)}	Turn-off delay	-	7.4	-		
t _F	Fall time	-	27	-		

Electrical Parameters

T_J=25°C unless otherwise stated

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
Reverse Device Characteristics						
V _{SD}	Source-Drain reverse voltage	-	2.3	-	V	V _{GS} =0V, I _{SD} =5A
t _{RR}	Reverse recovery time	-	14	-	ns	I _F =10A, V _{DD} =400V, dI _F /dt=165A/μs
Q _{RR}	Reverse recovery charge	-	6.5	-	nC	

Typical Characteristics

$T_J=25^\circ\text{C}$ unless otherwise stated

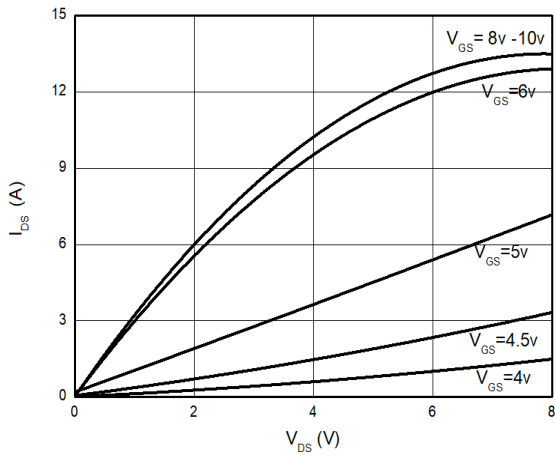


Figure 1. Typical Output Characteristics $T_J=25^\circ\text{C}$

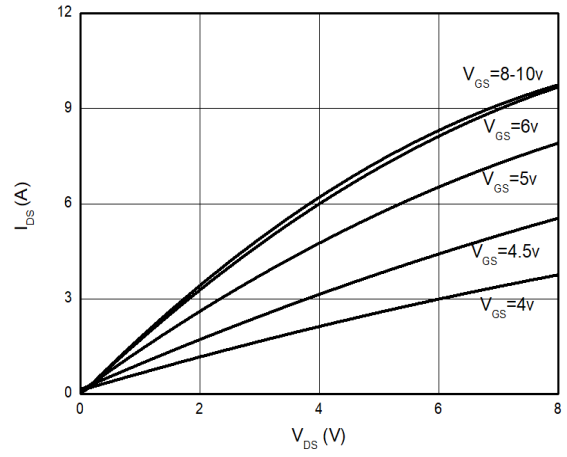


Figure 2. Typical Output Characteristics $T_J=125^\circ\text{C}$

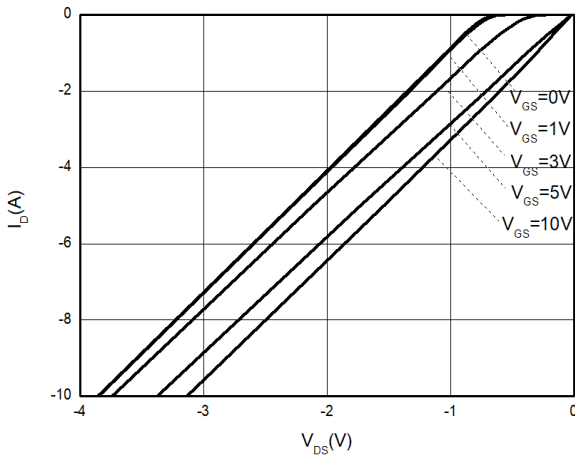


Figure 3. Channel Reverse Characteristics $T_J=25^\circ\text{C}$

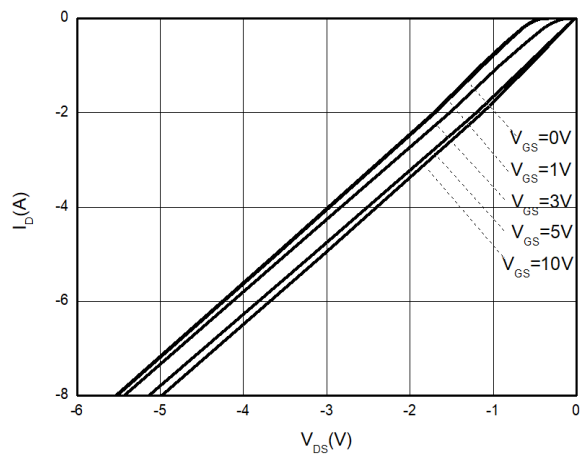


Figure 4. Channel Reverse Characteristics $T_J=125^\circ\text{C}$

Typical Characteristics

$T_J=25^\circ\text{C}$ unless otherwise stated

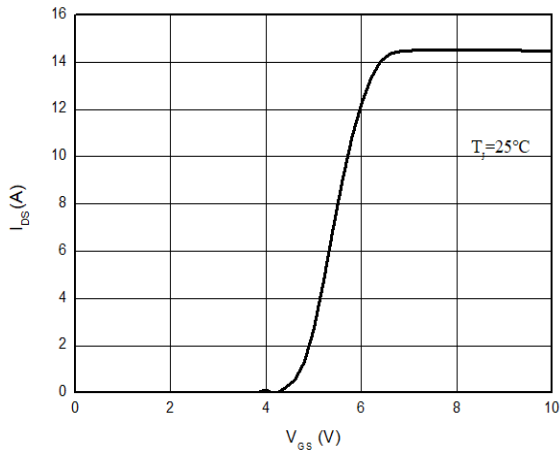


Figure 5. Typical Transfer Characteristics ($V_{ds}=10\text{V}$)

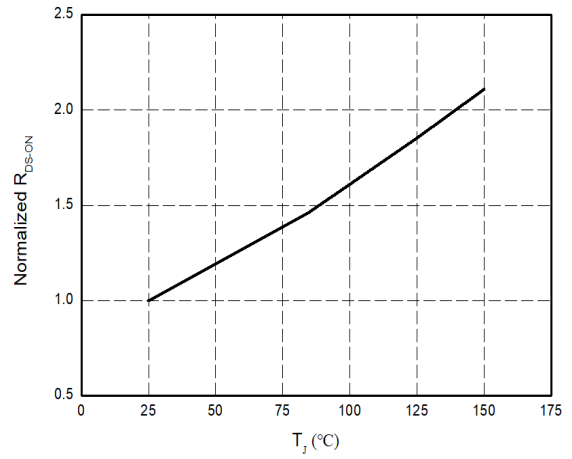


Figure 6. Normalized On-resistance

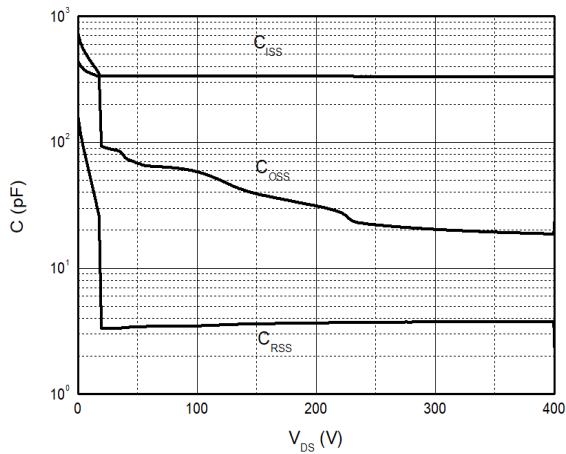


Figure 7. Typical Capacitance ($f=1\text{MHz}$)

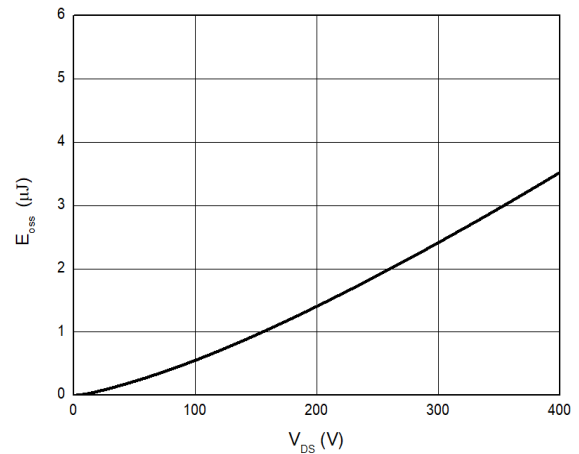


Figure 8. Typical C_{oss} Stored Energy

Typical Characteristics

$T_J=25^\circ\text{C}$ unless otherwise stated

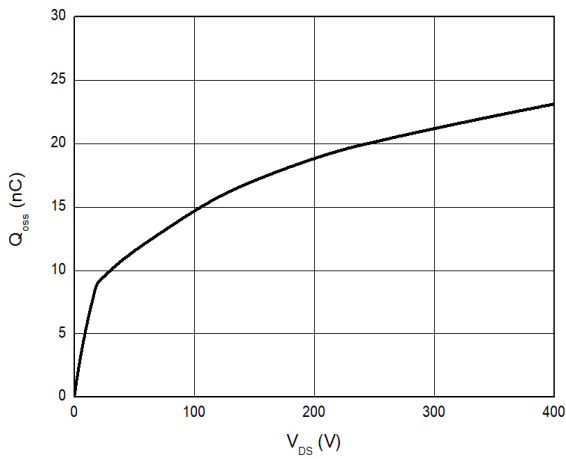


Figure 9. Typical Q_{oss}

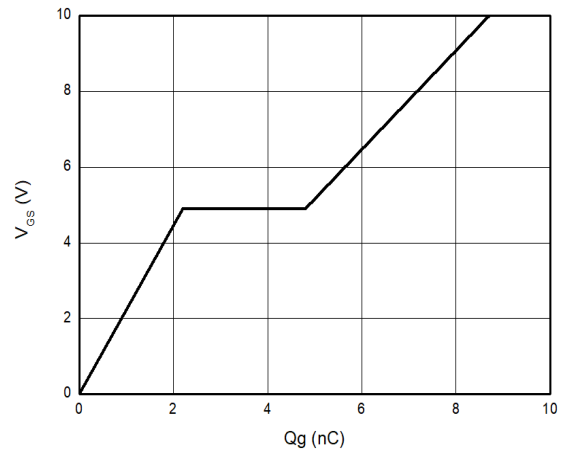


Figure 10. Typical Gate Charge ($V_{DS}=400\text{V}$, $I_D=1\text{A}$)

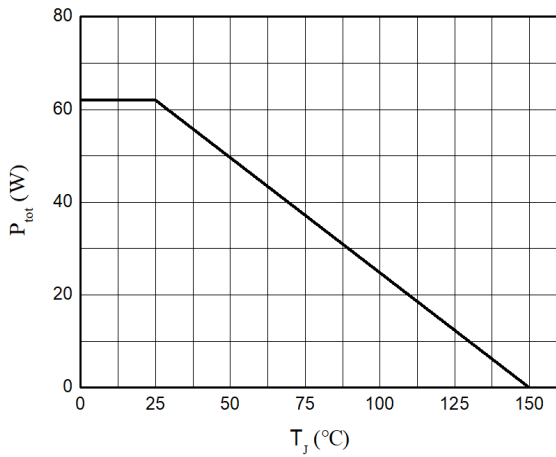


Figure 11. Power Dissipation

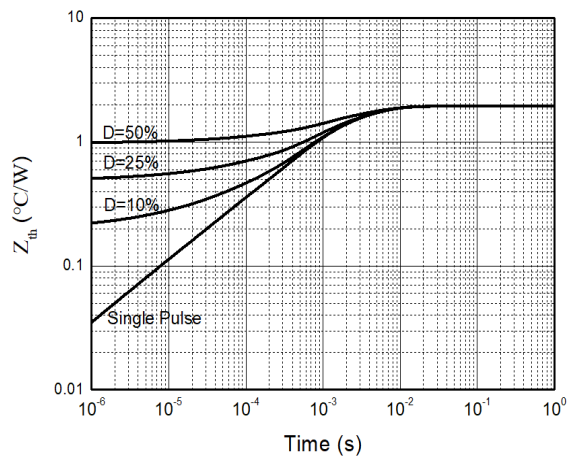


Figure 12. Transient Thermal Resistance

Typical Characteristics

$T_J=25^\circ\text{C}$ unless otherwise stated

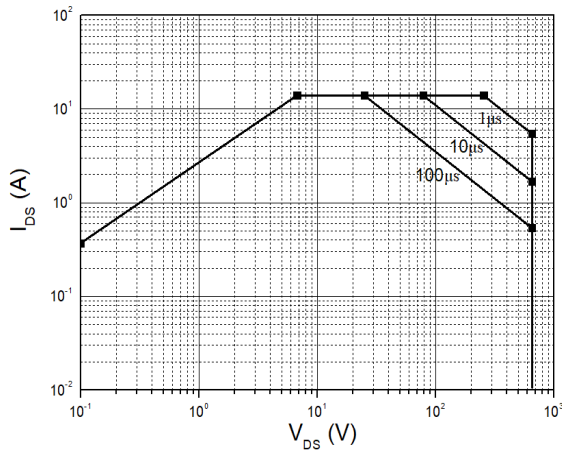


Figure 13. Safe Operating Area $T_c=25^\circ\text{C}$

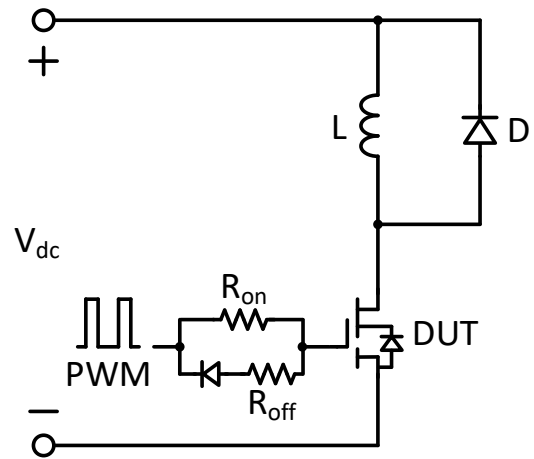


Figure 14. Switching times with inductive load

$V_{DS}=400\text{V}$, $V_{GS}=0\text{V}$ to 10V , $I_D=2.1\text{A}$,
 $R_{G-on(ext)}=6.8\Omega$, $R_{G-off(ext)}=2.2\Omega$, $L=250\mu\text{H}$

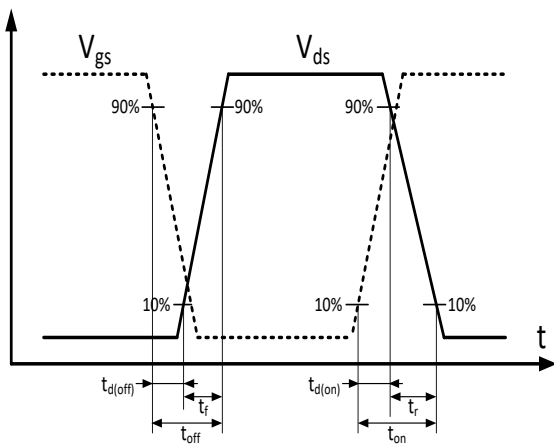
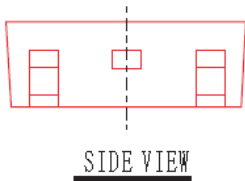
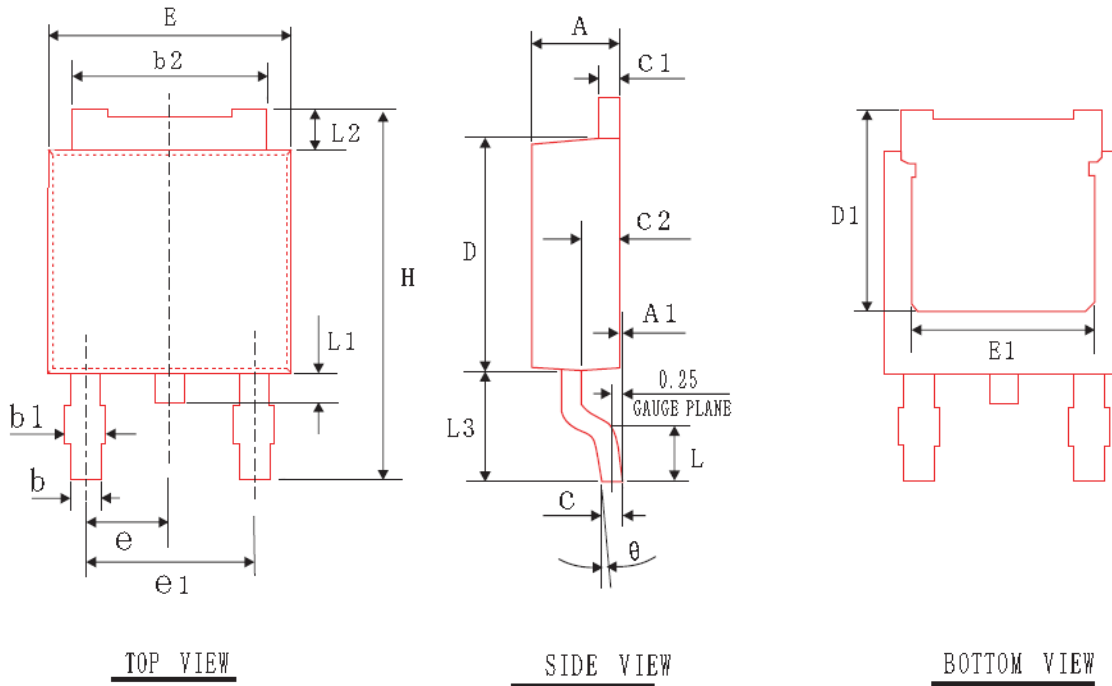


Figure 15. Switching times with waveform

PACKAGE DIMENSIONS

TO252-2L



COMMON DIMENSIONS
(UNITS OF MEASURE-mm)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	0.05	0.10
b	0.762	0.812	0.862
b ₁	---	---	1.10
b ₂	5.23	5.33	5.43
c	0.458	0.508	0.558
c ₁	0.458	0.508	0.558
c ₂	0.80	1.00	1.20
D	6.00	6.10	6.20
D ₁	5.25	5.45	5.65
H	10.00	10.10	10.20
E	6.50	6.60	6.70
E ₁	4.75	4.85	4.95
e ₁	4.37	4.57	4.77
L	---	---	1.45
L ₁	0.60	0.75	0.90
L ₂	0.90	1.10	1.30
L ₃	2.80	3.00	3.20
θ	0°	4°	8°
e	2.285 BSC		