

650V GaN HEMT

Description

The CC65H600DNZI Series 650V, 600mΩ 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

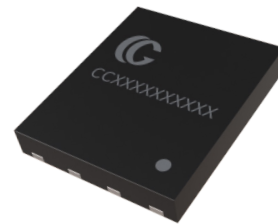
Increased efficiency through fast switching

Increased power density

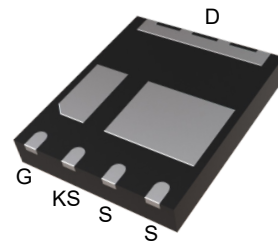
Reduced system size and weight

Ordering Information

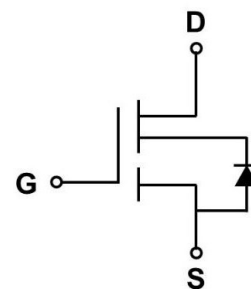
Part Number	Package	Package Configuration
CC65H600DNZI	DFN5*6	Source



top



bottom



Circuit Symbol

Features

BV_{DSS}	$R_{DS(ON)}$	I_{DS}	Q_G
650V	600mΩ	5.6A	8nC

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	5.6	A	
	Continuous drain current @ $T_c=125^\circ\text{C}$ ^b	2.5		
I_{DM}	Pulse drain current (pulse width: 100 μs)	8	A	
P_D	Maximum power dissipation @ $T_c=25^\circ\text{C}$	41	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	3	°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	1.2	1.7	2.2	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	-	600	720	mΩ	V _{GS} =10V, I _D =1A, T _J =25°C
		-	1260	-		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	-	400	-	pF	V _{GS} =0V, V _{DS} =400V, f=1MHz
C _{OSS}	Output capacitance	-	26	-		
C _{RSS}	Reverse capacitance	-	1.2	-		
Q _G	Total gate charge	-	8	-	nC	V _{DS} =400V, V _{GS} =0V to 10V, I _D =1A
Q _{GS}	Gate-source charge	-	1.2	-		
Q _{GD}	Gate-drain charge	-	2	-		
Q _{OSS}	Output charge	-	37	-	nC	V _{GS} =0V, V _{DS} =0V to 400V, f=1MHz
t _{D(on)}	Turn-on delay	-	2.5	-	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	-	7	-		
t _{D(off)}	Turn-off delay	-	9.7	-		
t _F	Fall time	-	28	-		

Electrical Parameters

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

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
Reverse Device Characteristics						
V_{SD}	Source-Drain reverse voltage	-	2.3	-	V	$V_{GS}=0V, I_{SD}=2.5A$
t_{RR}	Reverse recovery time	-	16	-	ns	$I_F=2.5A, V_{DD}=400V, dI_F/dt=165A/\mu s$
Q_{RR}	Reverse recovery charge	-	6.8	-	nC	

Typical Characteristics

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

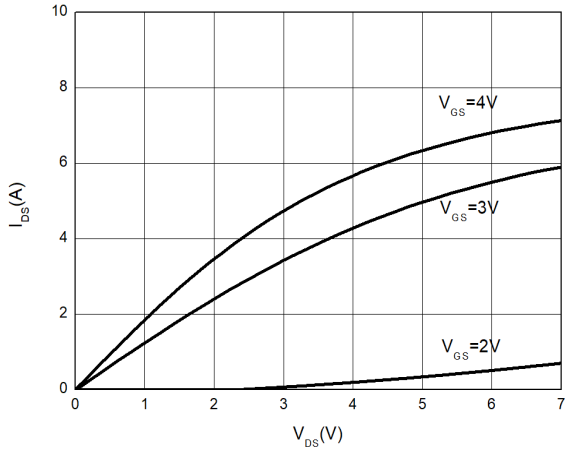


Figure 1. Typical Output Characteristics $T_J=25^\circ\text{C}$

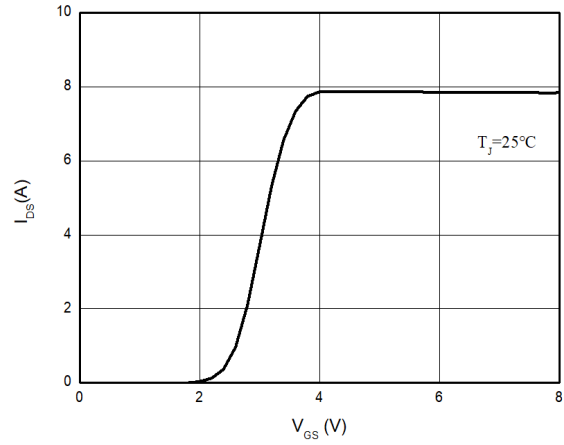


Figure 2. Typical Transfer Characteristics ($V_{DS}=5V$)

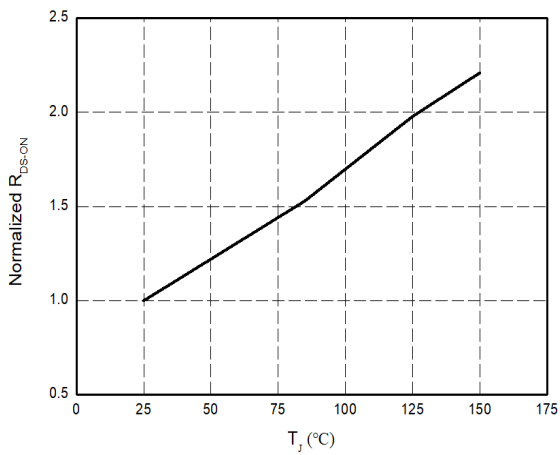


Figure 3. Normalized On-resistance

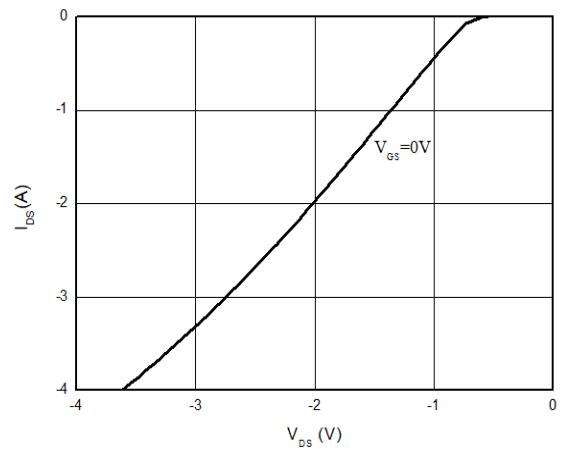


Figure 4. Channel Reverse Characteristics $T_J=25^\circ\text{C}$

Typical Characteristics

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

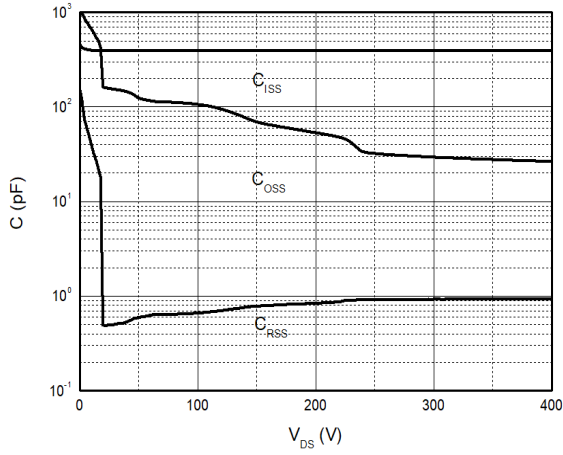


Figure 5. Typical Capacitance (f=1MHz)

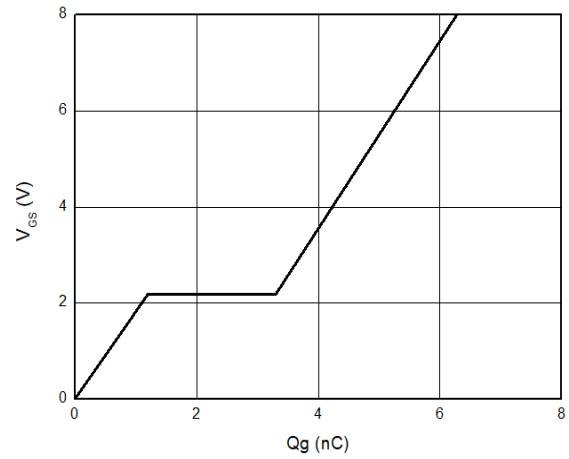


Figure 6. Typical Gate Charge ($V_{DS}=400\text{V}$, $I_D=1\text{A}$)

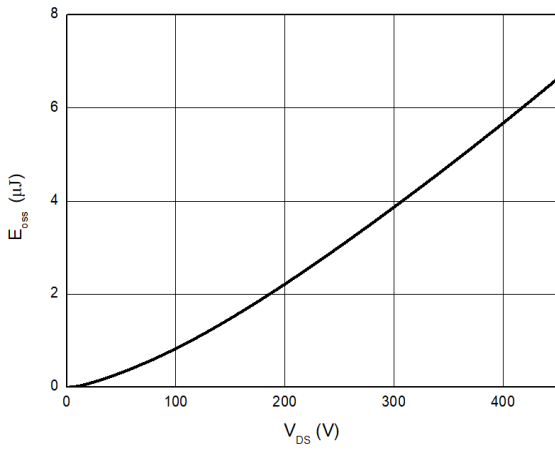


Figure 7. Typical C_{OSS} Stored Energy

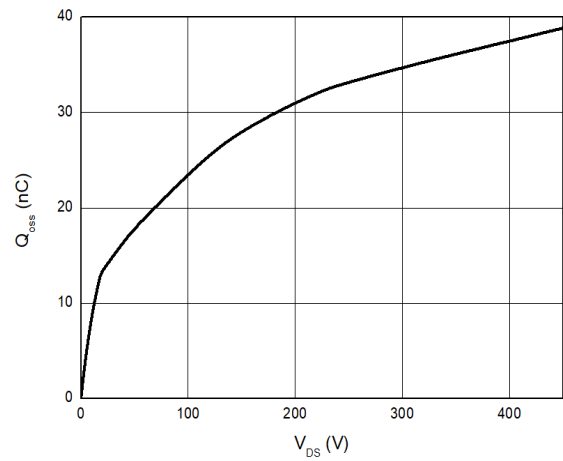


Figure 8. Typical Q_{OSS}

Typical Characteristics

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

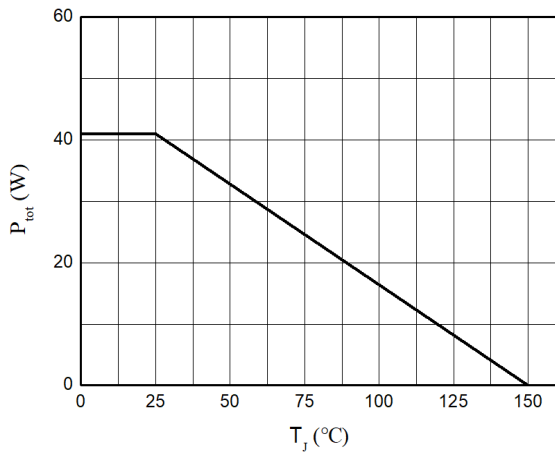


Figure 9. Power Dissipation

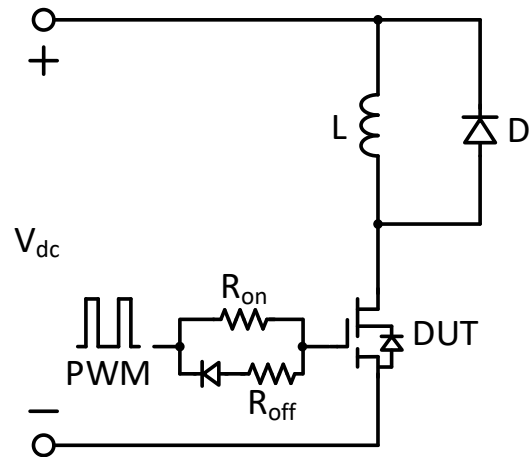


Figure 10. Switching times with inductive load

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

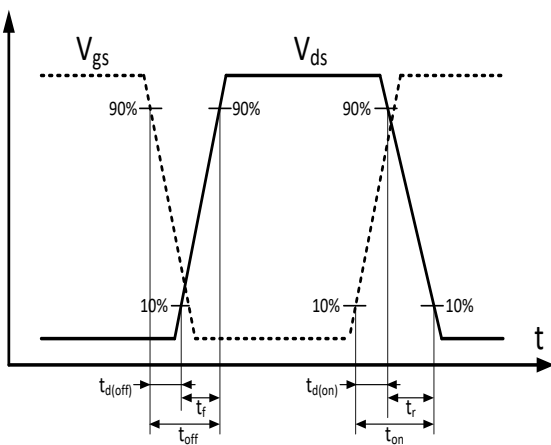
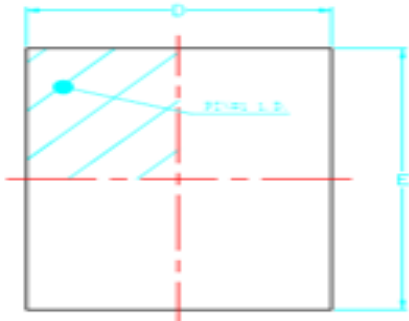
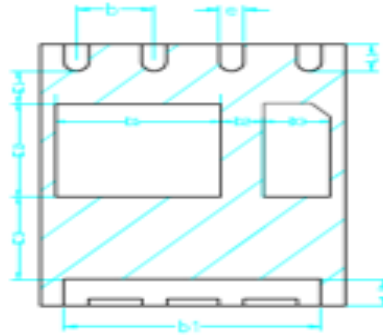


Figure 11. Switching times with waveform

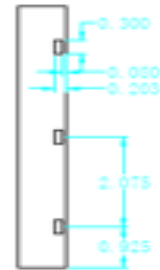
PACKAGE DIMENSIONS



TOP VIEW



BOTTOM VIEW



SIDE VIEW



SIDE VIEW

符号	尺寸 (单位: mm)		
	最小值	标准值	最大值
A	0.80	0.90	1.00
A1	0.203Ref		
A2	—	0.02	0.05
D	4.90	5.00	5.10
E	5.90	6.00	6.10
D1	2.61	2.71	2.81
D2	0.60	0.70	0.80
D3	0.99	1.09	1.19
E1	0.65	0.75	0.85
E2	2.05	2.15	2.25
E3	1.80	1.90	2.00
b	1.17	1.27	1.37
b1	4.11	4.21	4.31
e	0.30	0.40	0.50
L1	0.50	0.60	0.70
L2	0.50	0.60	0.70