



CE65H110TOAI

CoreGaN 650V GaN HEMT

Description

The CE65H110TOAI Series 650V, 110mΩ gallium nitride (GaN) FETs are normally-off devices.

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

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

Application

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

General Features

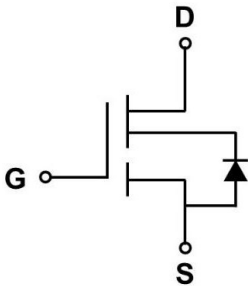
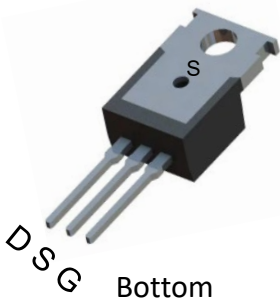
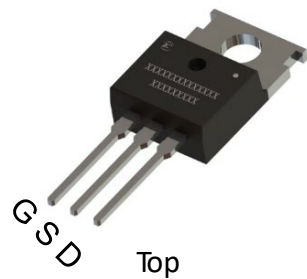
Easy to drive—compatible with standard gate drivers
Low conduction and switching losses
RoHS compliant and Halogen-free

Benefits

Increased efficiency through fast switching
Increased power density
Reduced system size and weight

Ordering Information

Part Number	Package	Package Configuration
CE65H110TOAI	TO220	Source



Circuit Symbol

Features

BV_{DSS}	$R_{DS(ON)}$	I_{DS}	Q_G
650V	110mΩ	21A	6.9nC



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
$V_{(TR)DSS}$	Drain to source voltage-transient ^a		800	
V_{GSS}	Gate to source voltage		-20 ~ +20	
I_D	Continuous drain current @ $T_c = 25^\circ\text{C}$ ^b		21	A
	Continuous drain current @ $T_c = 125^\circ\text{C}$ ^b		9	
I_{DM}	Pulse drain current (pulse width: 10 μs)		35	A
P_D	Maximum power dissipation @ $T_c = 25^\circ\text{C}$		125	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



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Thermal Resistance

Symbol	Parameter	Limit value	Unit
$R_{\theta JC}$	Junction-to-case	1	°C /W



Electrical Parameters

$T_J = 25^\circ\text{C}$ 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	$V_{DS} = 1V, I_{DS} = 1mA$
$\Delta V_{GS(th)}/T_J$	Gate threshold voltage temperature coefficient	-	-7	-	mV/ $^\circ\text{C}$	
$R_{DS(on)}$	Drain-source on-Resistance	-	110	145	m Ω	$V_{GS} = 10V, I_D = 7A, T_J = 25^\circ\text{C}$
		-	230	-		$V_{GS} = 10V, I_D = 7A, T_J = 150^\circ\text{C}$
I_{DSS}	Drain-to-source leakage current	-	1	10	μA	$V_{DS} = 650V, V_{GS} = 0V, T_J = 25^\circ\text{C}$
		-	5	100		$V_{DS} = 650V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-source forward leakage current	-	-	± 100	nA	$V_{GS} = \pm 20V$
C_{ISS}	Input capacitance	-	330	-	pF	$V_{GS} = 0V, V_{DS} = 400V, f = 1MHz$
C_{OSS}	Output capacitance	-	33	-		
C_{RSS}	Reverse capacitance	-	1.6	-		
Q_G	Total gate charge	-	6.9	-	nC	$V_{DS} = 400V, V_{GS} = 0V \text{ to } 10V, I_D = 1A$
Q_{GS}	Gate-source charge	-	2	-		
Q_{GD}	Gate-drain charge	-	3	-		
Q_{OSS}	Output charge	-	48	-	nC	$V_{GS} = 0V, V_{DS} = 0V \text{ to } 400V, f = 1MHz$
$t_{D(on)}$	Turn-on delay	-	6.3	-	ns	$V_{DS} = 400V, V_{GS} = 0V \text{ to } 10V, I_D = 2.1A,$ $R_{G-on(ext)} = 6.8\Omega, R_{G-off(ext)} = 2.2\Omega,$ $L = 250\mu H$
t_R	Rise time	-	4.1	-		
$t_{D(off)}$	Turn-off delay	-	16.2	-		
t_F	Fall time	-	24.1	-		



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	-	2.1	-	V	V _{GS} =0V, I _S =10A
t _{RR}	Reverse recovery time	-	14	-	ns	I _s =10A, V _{DD} =400V, di/dt=165A/μs
Q _{RR}	Reverse recovery charge	-	6.5	-	nC	



Typical Characteristics

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

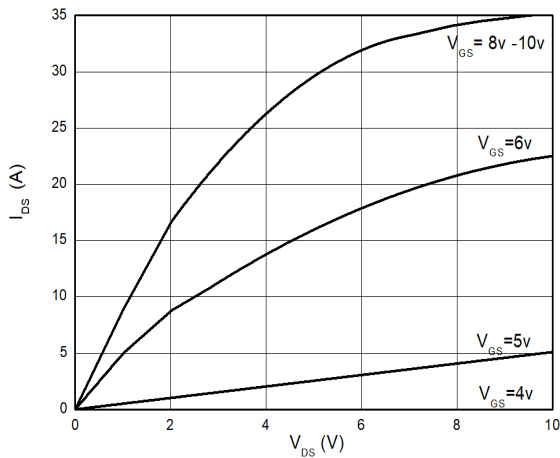


Figure 1. Typical Output Characteristics $T_j = 25^\circ\text{C}$

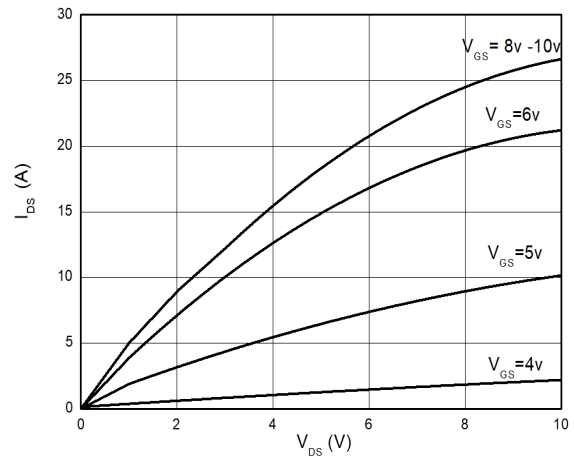


Figure 2. Typical Output Characteristics $T_j = 125^\circ\text{C}$

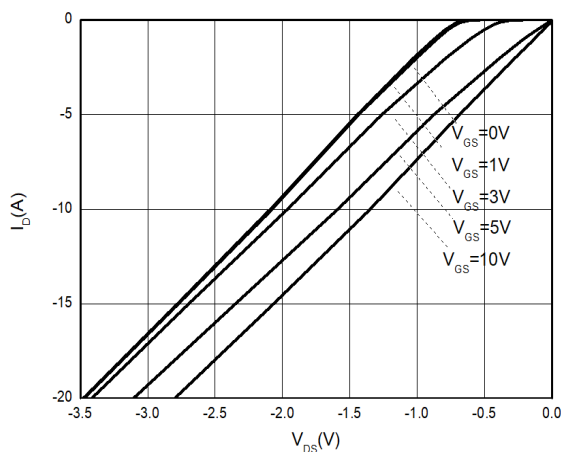


Figure 3. Channel Reverse Characteristics $T_j = 25^\circ\text{C}$

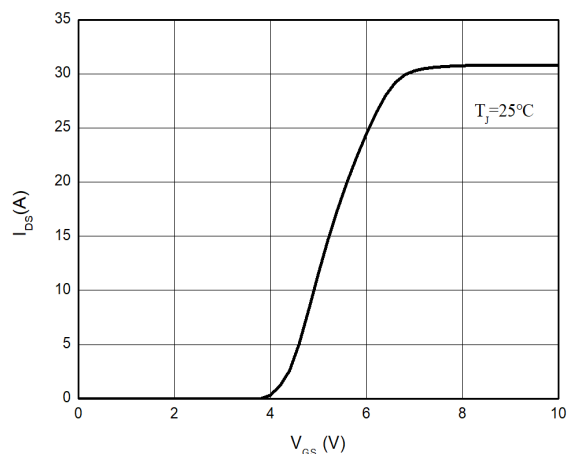


Figure 4. Typical Transfer Characteristics ($V_{ds} = 10\text{V}$)



Typical Characteristics

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

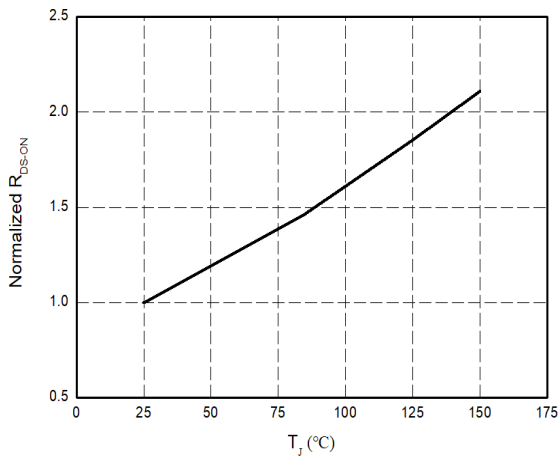


Figure 5. Normalized On-resistance

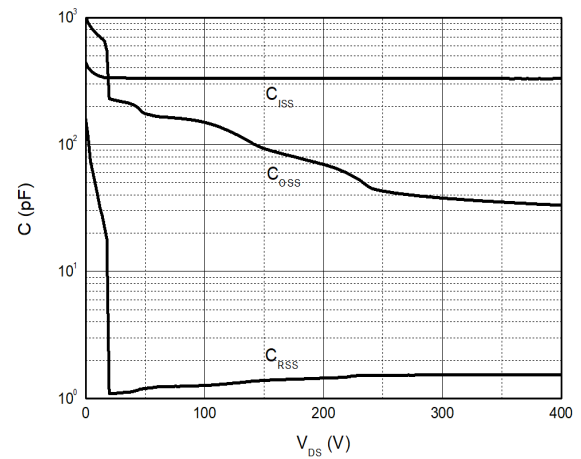


Figure 6. Typical Capacitance ($f=1\text{MHz}$)

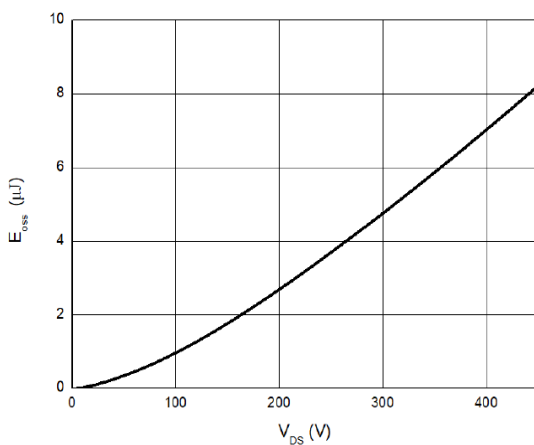


Figure 7. Typical C_{oss} Stored Energy

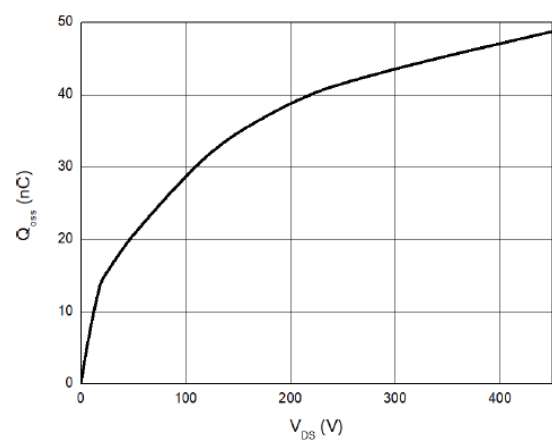


Figure 8. Typical Q_{oss}



Typical Characteristics

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

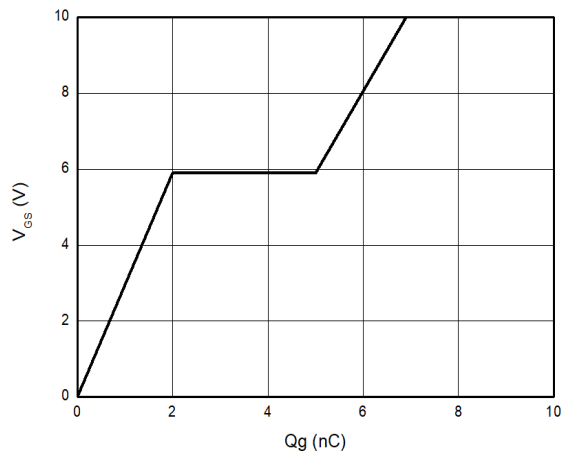


Figure 9. Typical Gate Charge ($V_{DS}=400\text{V}$, $I_D=1\text{A}$)

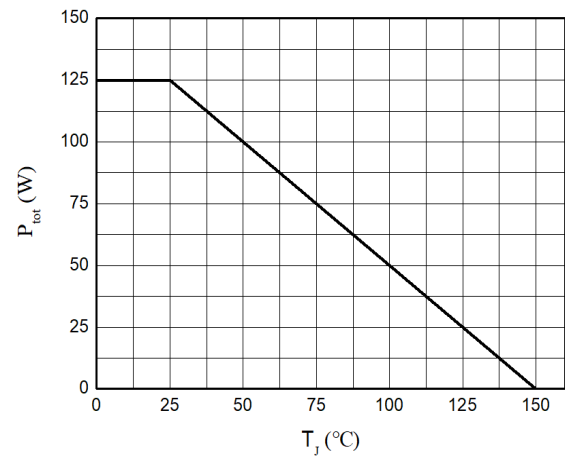


Figure 10. Power Dissipation

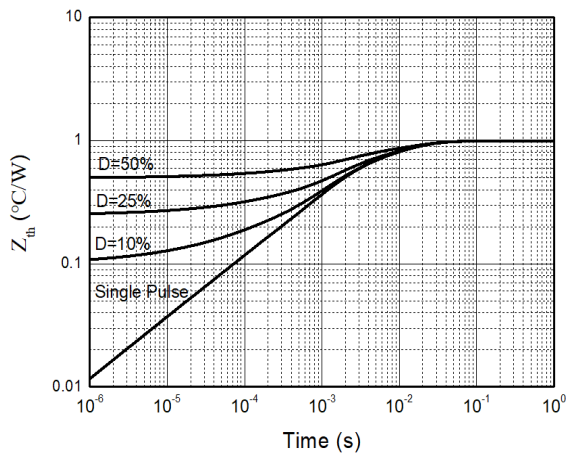


Figure 11. Transient Thermal Resistance

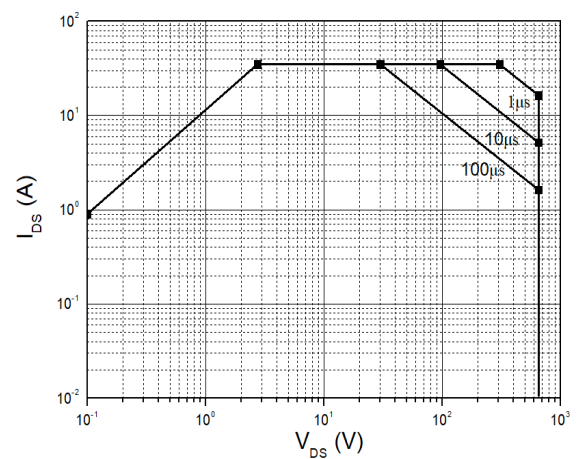


Figure 12. Safe Operating Area $T_J=25^\circ\text{C}$



Typical Characteristics

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

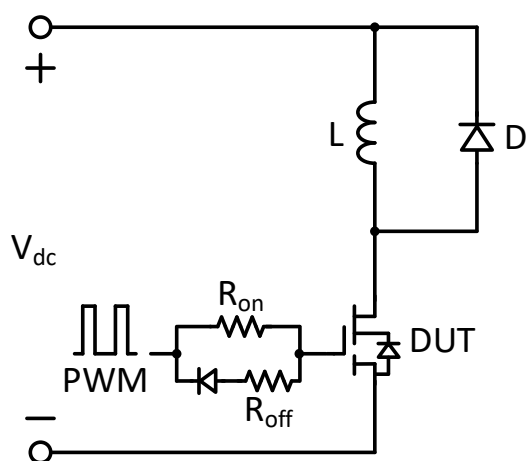


Figure 13. Switching times with inductive load

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

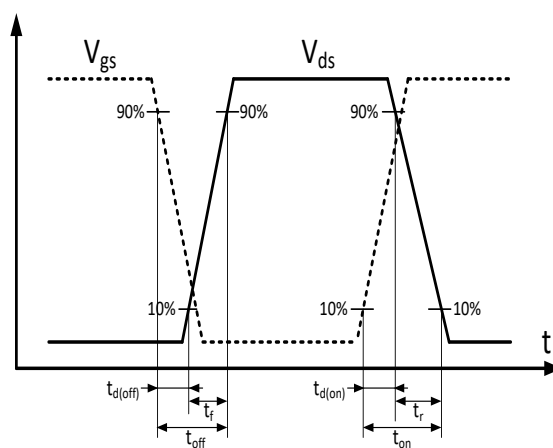
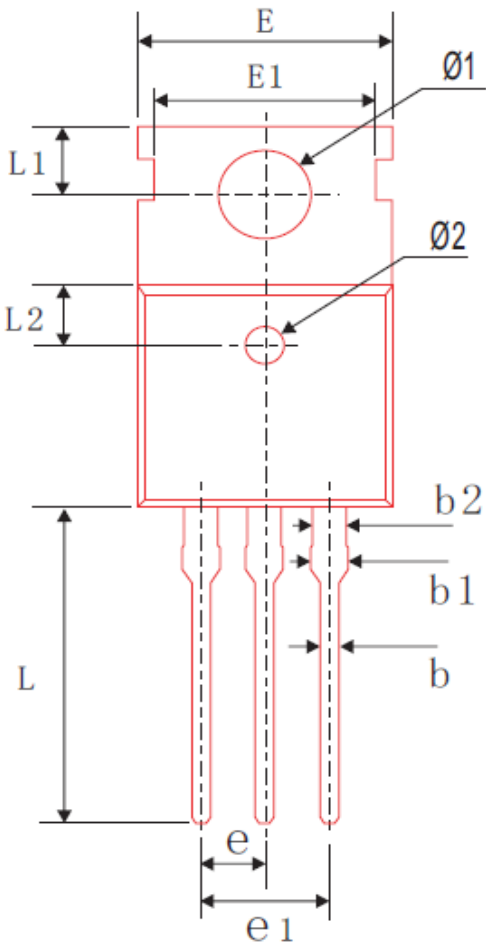


Figure 14. Switching times with waveform

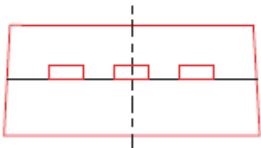


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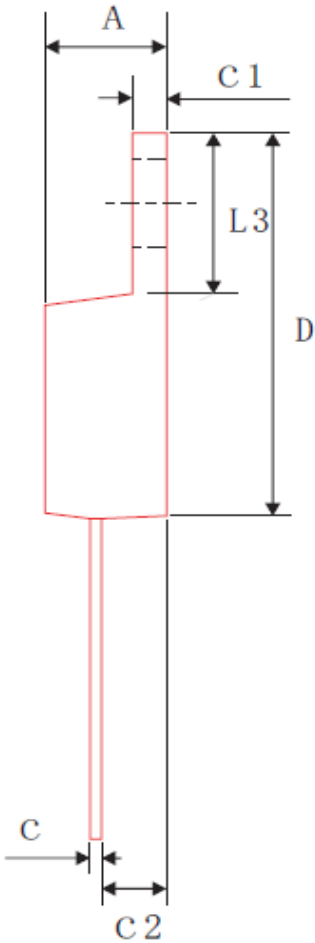
TO220-3L



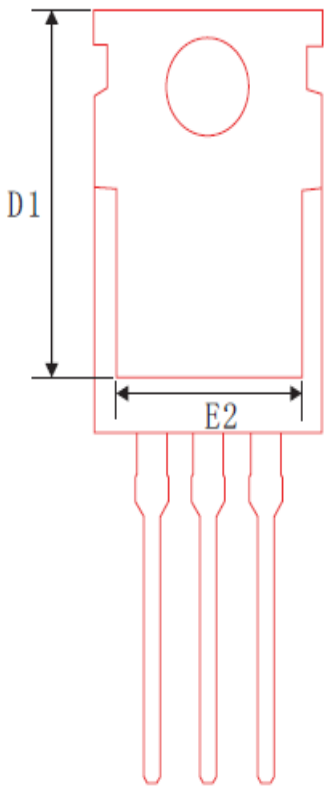
TOP VIEW



SIDE VIEW



SIDE VIEW



BOTTOM VIEW

SYMBOL	MIN	NOM	MAX
A	4.30	4.50	4.70
b	0.70	0.80	0.90
b1	—	—	1.42
b2	1.17	1.27	1.37
c	0.40	0.50	0.60
C1	1.25	1.30	1.35
C2	2.20	2.40	2.60
D	15.45	15.65	15.85
D1	13.20	13.40	13.60
E	9.80	10.0	10.2
E1	8.60	8.70	8.80
E2	7.80	8.00	8.20
e1	4.88	5.08	5.28
L	12.95	13.15	13.35
L1	2.70	2.80	2.90
L2	2.40	2.50	2.60
L3	6.30	6.50	6.70
Ø1	3.50	3.60	3.70
Ø2	1.35	1.50	1.65
e	2.54BSC		



CE65H110TOAI

Revision history

Major changes since the last revision

Revision	Date	Description of changes
1.0	2022-02-28	Initial release
2.0	2023-10-30	Enrich dynamic specification curves
3.0	2023-12-25	Update dynamic parameters
4.0	2025-01-02	Optimize application platform testing