CorEnergy®

CE65H450TOEI

CoreGaN 650V GaN HEMT

Description

The CE65H450TOEI Series 650V, 450mΩ gallium nitride (GaN) FETs are normally-off devices.

Corenergy 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.

Corenergy 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

Ordering Information

Part Number	Package	Package Configuration
CE65H450TOEI	TO252	Source
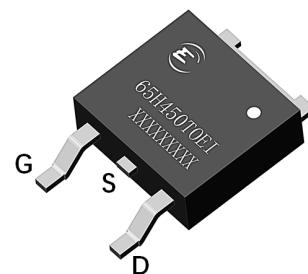
Top

Bottom

Circuit Symbol

Benefits

Increased efficiency through fast switching

Increased power density

Reduced system size and weight
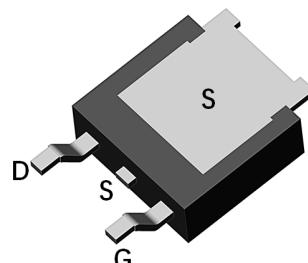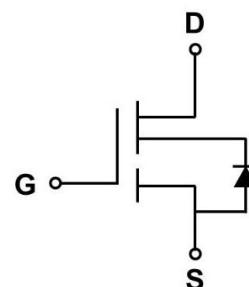
Features

BV_{DSS}	R_{DSON}	I_{DS}	Q_G
650V	450mΩ	7A	7.6nC

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Absolute Maximum Ratings

T_C=25°C unless otherwise stated

Symbol	Parameter		Limit value	Unit
V_{DSS}	Drain to source voltage (T_J = -55°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°C [b]		7	A
	Continuous drain current @T_C=125°C [b]		3	
I_{DM}	Pulse drain current (pulse width: 10μs)		10.5	A
P_D	Maximum power dissipation @ T_C=25°C		52	W
T_C	Operating temperature	Case	-55~150	°C
T_J		Junction	-55~150	°C
T_S	Storage temperature		-55~150	°C

a. In off-state, spike duty cycle D<0.01, spike duration <1μs

b. For increased stability at high current operation

CE65H450TOEI

Thermal Resistance

Symbol	Parameter	Limit value	Unit
$R_{\theta JC}$	Junction-to-case	2.4	°C /W

CE65H450TOEI

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
$\triangle V_{GS(th)}/T_J$	Gate threshold voltage temperature coefficient	-	-7	-	mV/°C	
$R_{DS(on)}$	Drain-source on-Resistance	-	450	520	mΩ	V_{GS}=10V, I_D=1A, T_J=25°C
		-	940	-		V_{GS}=10V, I_D=1A, T_J=150°C
I_{DSS}	Drain-to-source leakage current	-	2	10	µA	V_{DS}=650V, V_{GS}= 0V, T_J=25°C
		-	5	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	-	335	-	pF	V_{GS}=0V, V_{DS}=400V, f=1MHz
C_{OSS}	Output capacitance	-	11	-		
C_{RSS}	Reverse capacitance	-	0.9	-		
Q_G	Total gate charge	-	7.6	-	nC	V_{DS}=400V, V_{GS}=0V to 10V, I_D=1A
Q_{GS}	Gate-source charge	-	2.3	-		
Q_{GD}	Gate-drain charge	-	2.8	-		
Q_{OSS}	Output charge	-	17	-	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	-	2.2	-	V	V_{GS}=0V, I_{SD}=3.5A
t_{RR}	Reverse recovery time	-	14	-	ns	I_F=2.5A, V_{DD}=400V, dI_F/dt=165A/µs
Q_{RR}	Reverse recovery charge	-	6.5	-	nC	

CE65H450TOEI

Typical Characteristics

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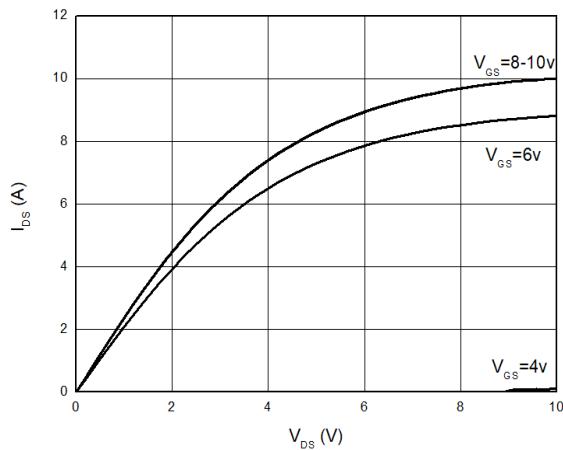
Figure 1. Typical Output Characteristics T_J=25°C
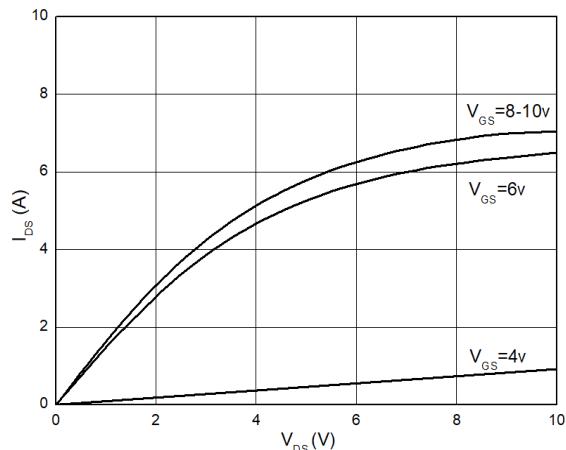
Figure 2. Typical Output Characteristics T_J=125°C
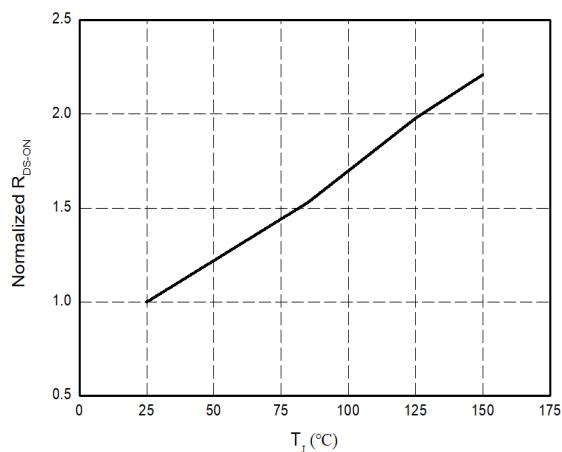
Figure 3. Normalized On-resistance
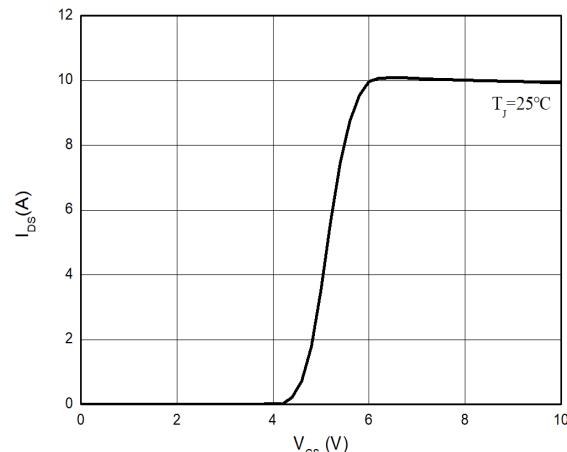
Figure 4. Typical Transfer Characteristics T_J=25°C

CE65H450TOEI

Typical Characteristics

T_j=25°C unless otherwise stated
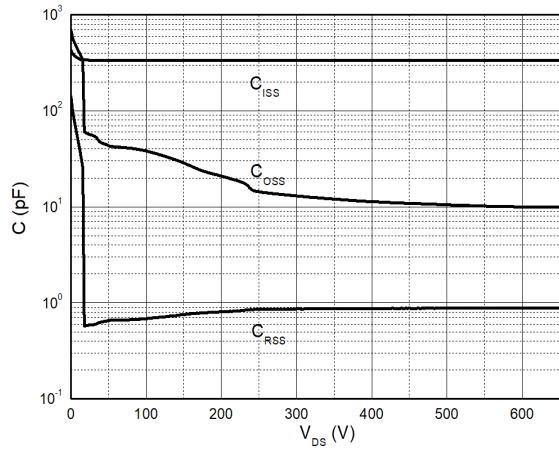
Figure 5. Typical Capacitance (f=1MHz)
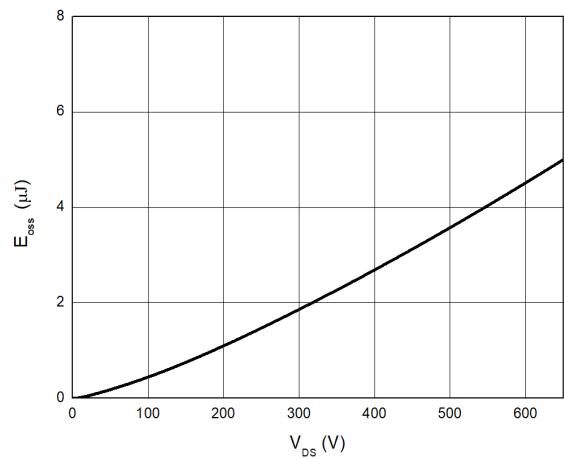

Figure 6. Typical C_{OSS} Stored Energy
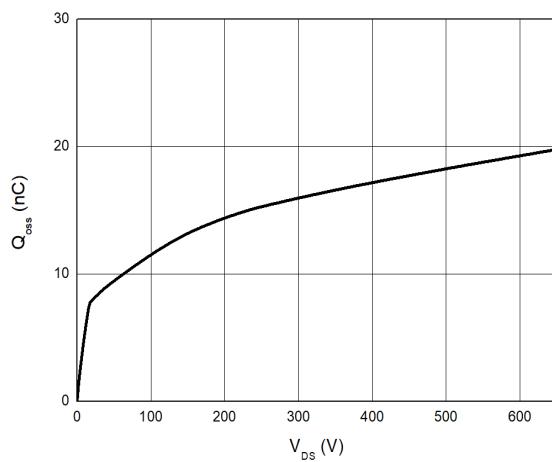
Figure 7. Typical Q_{OSS}
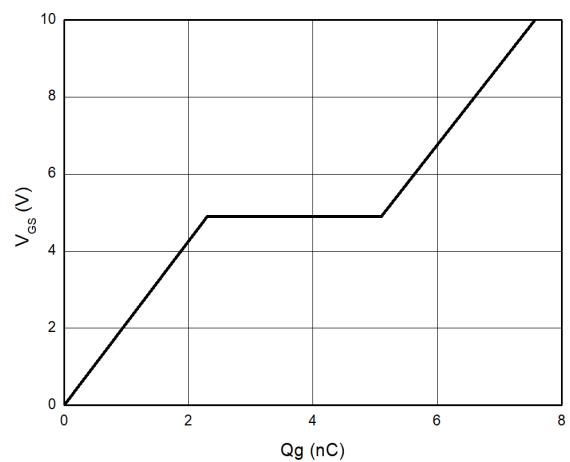
Figure 8. Typical Gate Charge (V_{DS}=400V, I_D=1A)

Typical Characteristics

T_j=25°C unless otherwise stated
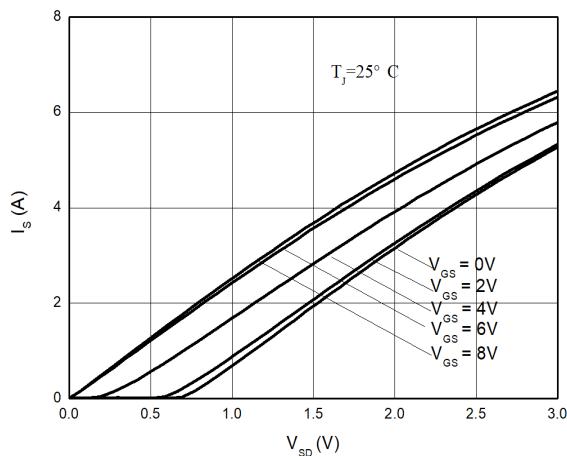
Figure 9. Channel Reverse Characteristics T_J=25°C
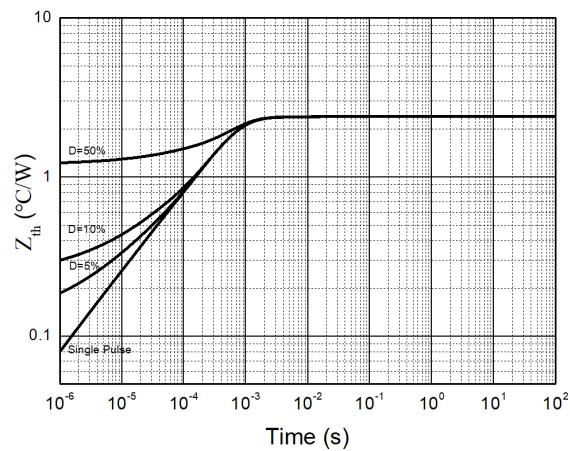
Figure 10. Transient Thermal Resistance
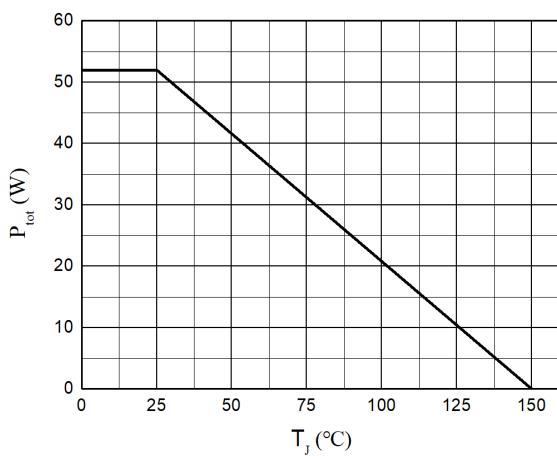
Figure 11. Power Dissipation
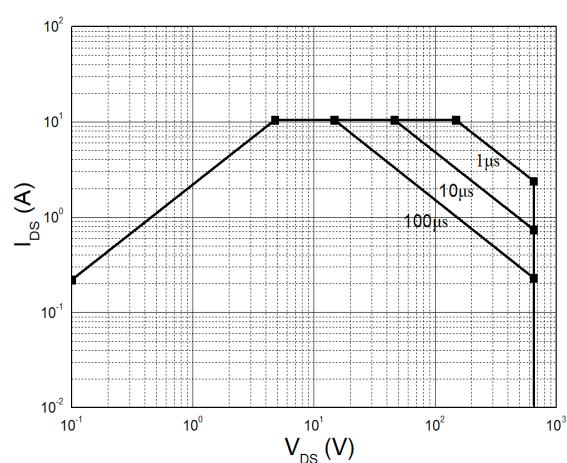
Figure 12. Safe Operating Area TJ=25°C

# Typical Characteristics

T_j=25°C unless otherwise stated
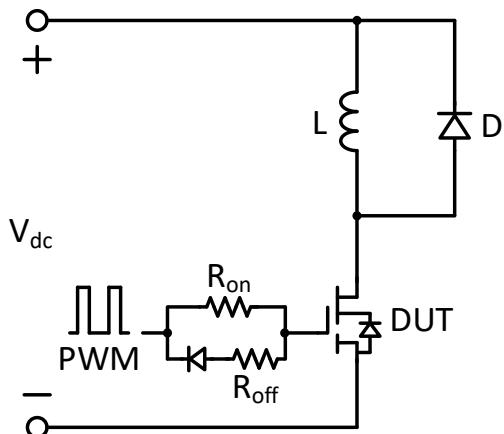
Figure 13. Switching times with inductive load

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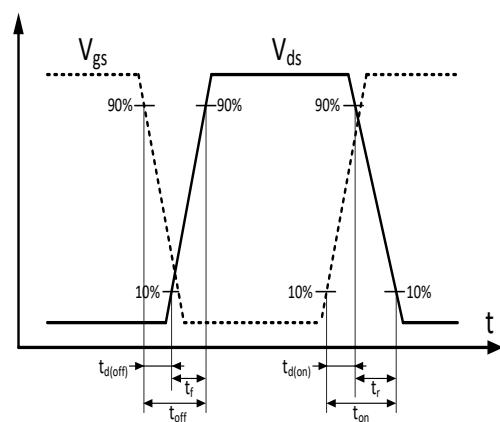

Figure 14. Switching times with waveform

CE65H450TOEI

## PACKAGE DIMENSIONS
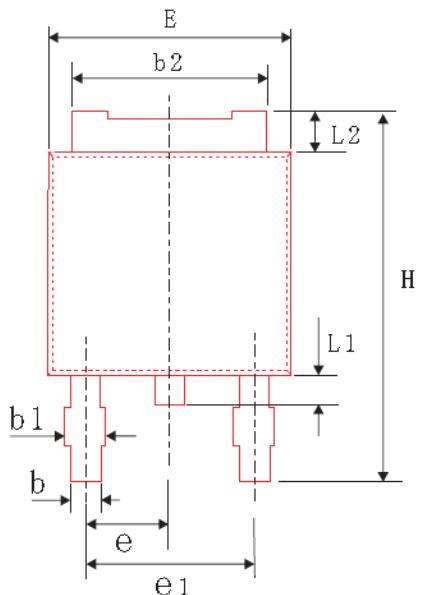
TOP VIEW
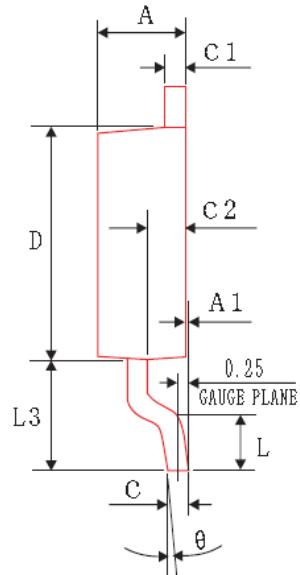
SIDE VIEW
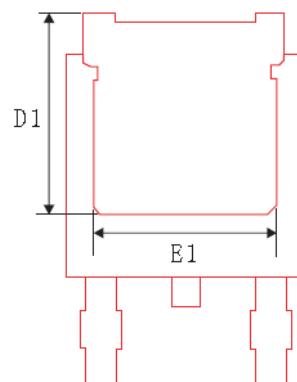
BOTTOM VIEW
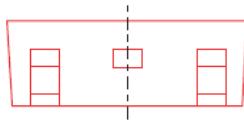
SIDE VIEW

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
b1	——	——	1.10
b2	5.23	5.33	5.43
c	0.458	0.508	0.558
c1	0.458	0.508	0.558
c2	0.80	1.00	1.20
D	6.00	6.10	6.20
D1	5.25	5.45	5.65
H	10.00	10.10	10.20
E	6.50	6.60	6.70
E1	4.75	4.85	4.95
e1	4.37	4.57	4.77
L	——	——	1.45
L1	0.60	0.75	0.90
L2	0.90	1.10	1.30
L3	2.80	3.00	3.20
θ	0°	4°	8°
e	2.285 BSC		

CE65H450TOEI

Revision history
Major changes since the last revision

Revision	Date	Description of changes
1.0	2024-05-06	Initial release