CorEnergy®

CE65H600TOEI

CoreGaN 650V GaN HEMT

Description

The CE65H600TOEI Series 650V, 600mΩ 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

Benefits

Increased efficiency through fast switching

Increased power density

Reduced system size and weight

Ordering Information

Part Number	Package	Package Configuration
CE65H600TOEI	TO252	Source

Top

Bottom
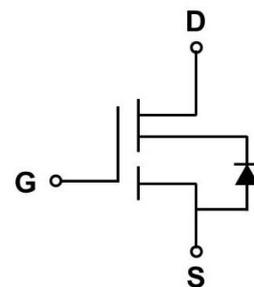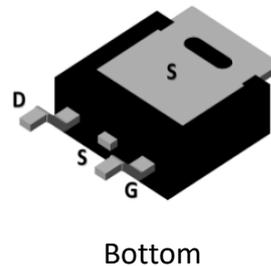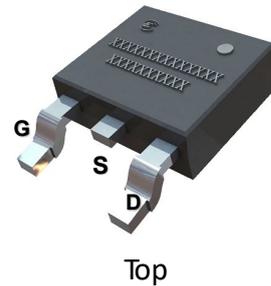
Circuit Symbol

Features

BV_{DSS}	R_{DSON}	I_{DS}	Q_G
650V	600mΩ	5A	8nC

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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]		5	A
	Continuous drain current @T_C=125°C [b]		2.4	
I_{DM}	Pulse drain current (pulse width: 10µs)		8	A
P_D	Maximum power dissipation @ T_C=25°C		41	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

Thermal Resistance

Symbol	Parameter	Limit value	Unit
$R_{\theta JC}$	Junction-to-case	3	°C /W

CE65H600TOEI

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	-	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	-	1	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	-	331	-	pF	V_{GS}=0V, V_{DS}=400V, f=1MHz
C_{OSS}	Output capacitance	-	11	-		
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	-	1.7	-		
Q_{GD}	Gate-drain charge	-	4	-		
Q_{OSS}	Output charge	-	14	-	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	-		

CE65H600TOEI

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}=2.5A
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	

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Typical Characteristics

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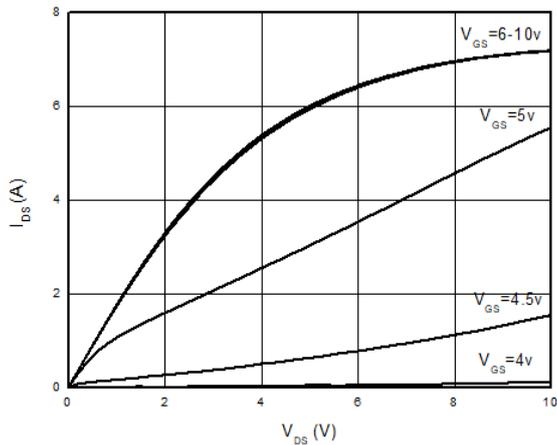
Figure 1. Typical Output Characteristics T_J=25°C
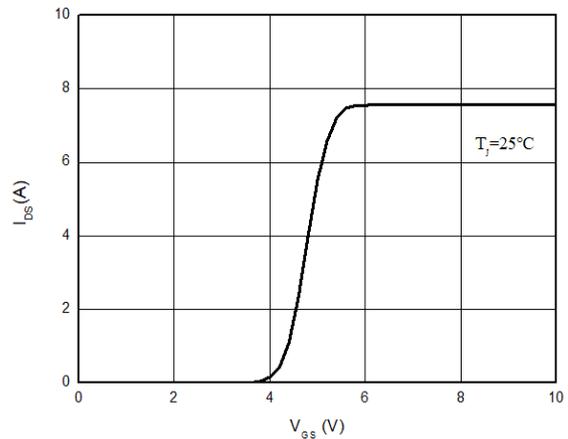
Figure 2. Typical Transfer Characteristics (V_{DS}=10V)
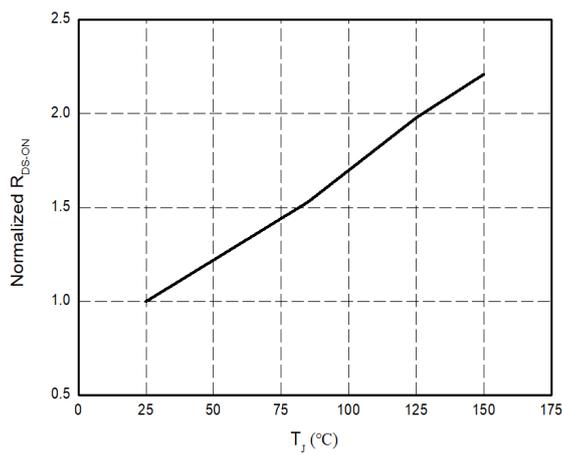
Figure 3. Normalized On-resistance
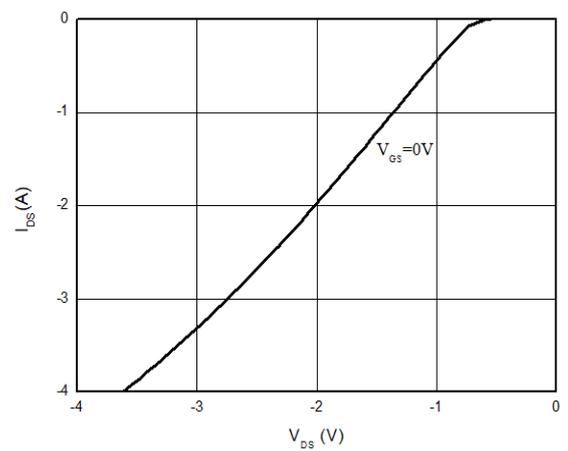
Figure 4. Channel Reverse Characteristics T_J=25°C

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Typical Characteristics

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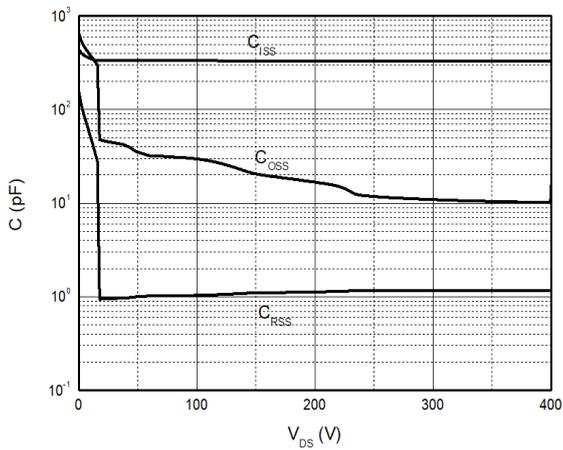
Figure 5. Typical Capacitance (f=1MHz)
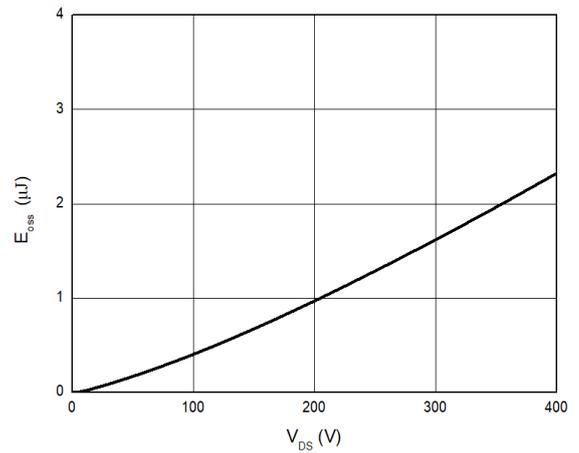

Figure 6. Typical C_{OSS} Stored Energy
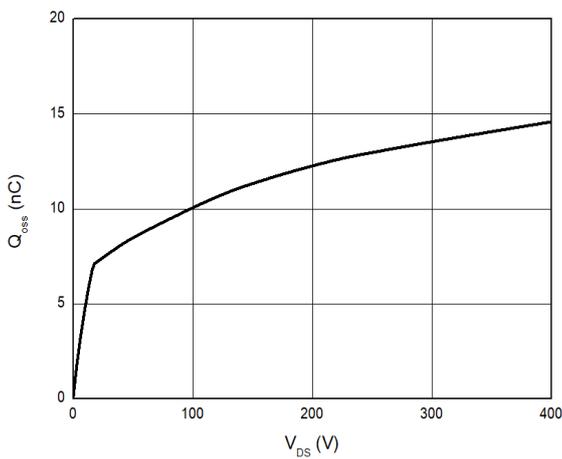
Figure 7. Typical Q_{OSS}
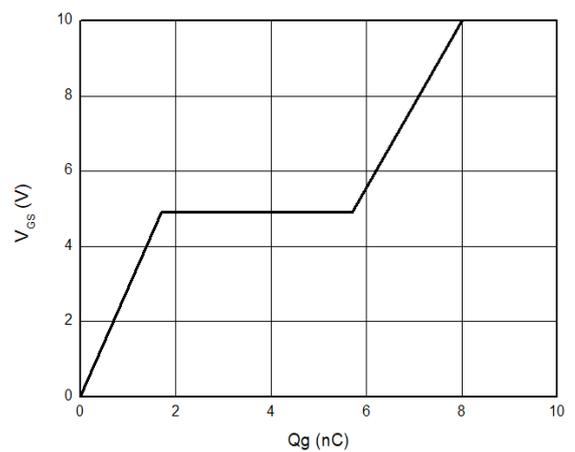
Figure 8. Typical Gate Charge (V_{DS}=400V, I_D=1A)

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Typical Characteristics

T_j=25°C unless otherwise stated
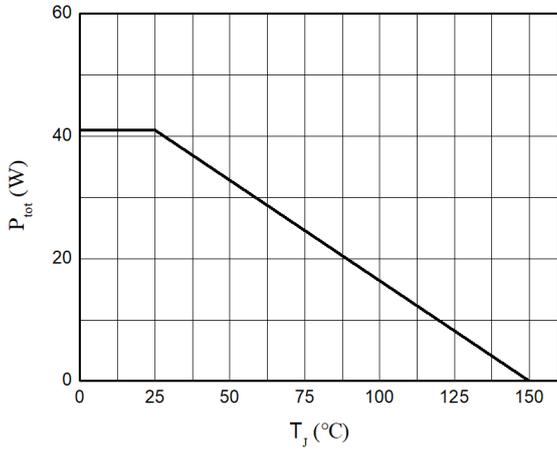
Figure 8. Power Dissipation
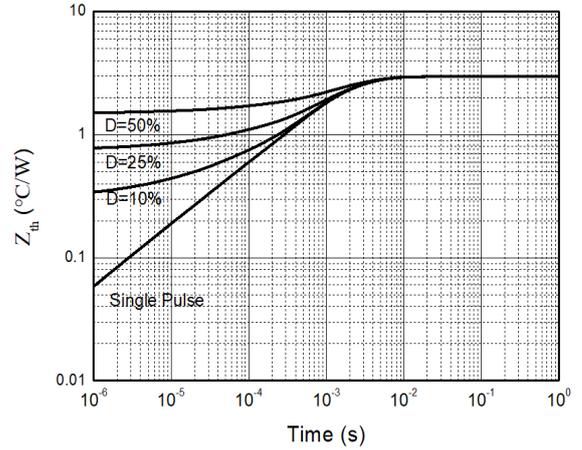

Figure 9. Transient Thermal Resistance
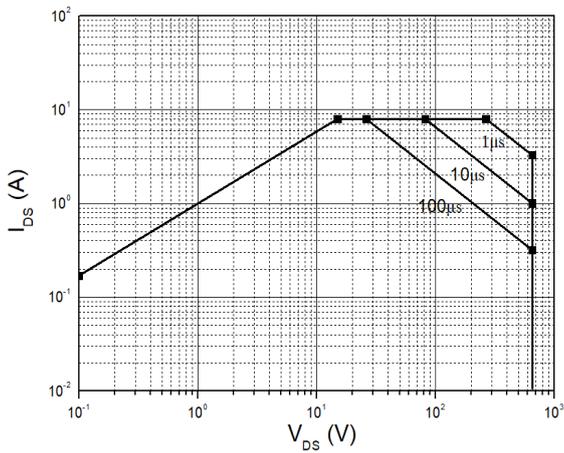
Figure 10. Safe Operating Area T_C=25°C

Typical Characteristics

T_j=25°C unless otherwise stated
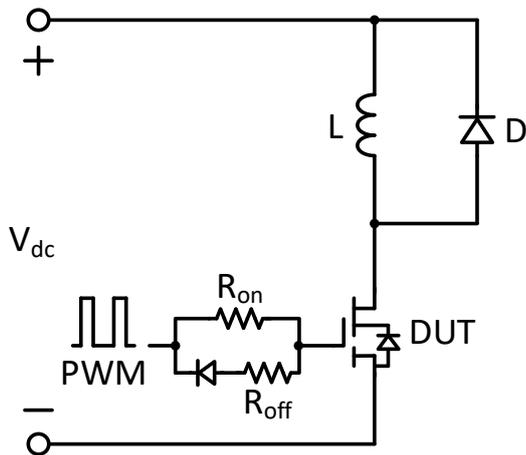
**Figure 11. Switching times with inductive load**

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
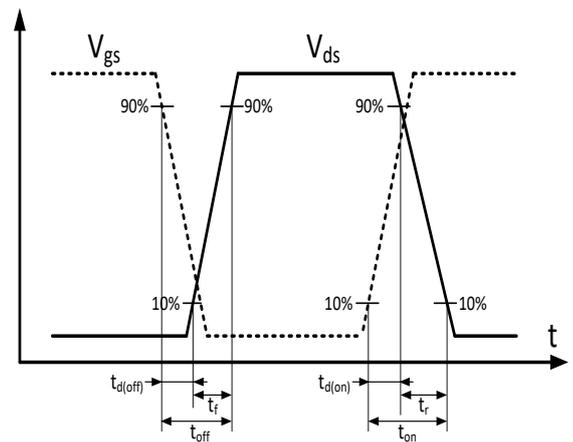
Figure 12. Switching times with waveform

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PACKAGE DIMENSIONS

TO252-2L
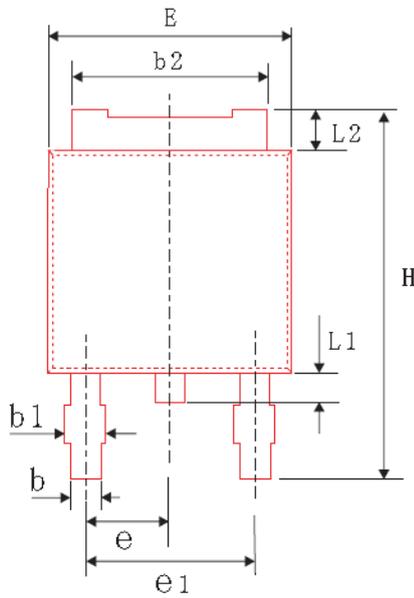
TOP VIEW
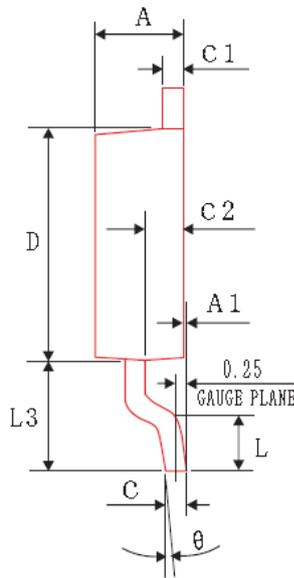
SIDE VIEW
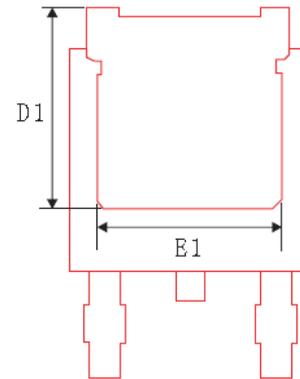
BOTTOM VIEW
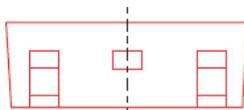
SIDE VIEW

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		

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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