



CoreGaN 650V GaN HEMT

Description

The CE65H600TOEI Series 650V, 600mΩ gallium nitride (GaN) FETs are normally-off devices.

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

Coreenergy 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

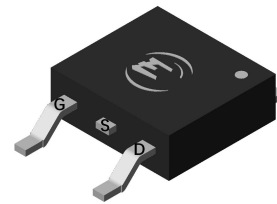
Increased efficiency through fast switching

Increased power density

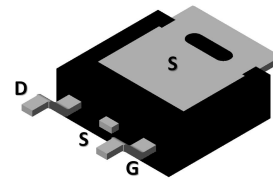
Reduced system size and weight

Ordering Information

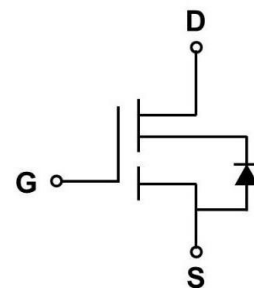
| Part Number | Package | Package Configuration |
|--------------|---------|-----------------------|
| CE65H600TOEI | TO252 | Source |



Top



Bottom



Circuit Symbol

Features

| BV_{DSS} | $R_{DS(on)}$ | I_{DS} | Q_G |
|------------|--------------|----------|-------|
| 650V | 600mΩ | 4.8A | 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 | 900 | V | |
| V_{GSS} | Gate to source voltage | -20~+20 | | |
| I_D | Continuous drain current @ $T_C=25^\circ\text{C}$ ^b | 4.8 | A | |
| | Continuous drain current @ $T_C=125^\circ\text{C}$ ^b | 2.1 | | |
| I_{DM} | Pulse drain current (pulse width: 100 μs) | 14 | A | |
| P_D | Maximum power dissipation @ $T_C=25^\circ\text{C}$ | 25 | 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 | 5 | $^{\circ}\text{C} / \text{W}$ |



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 | - | 1.9 | - | V | |
| ΔV _{GS(th)} /T _J | Gate threshold voltage temperature coefficient | - | -7 | - | mV/°C | V _{DS} =1V, I _{DS} =1mA |
| 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 | - | 243 | - | pF | V _{GS} =0V, V _{DS} =400V, f=1MHz |
| C _{OSS} | Output capacitance | - | 5.3 | - | | |
| C _{RSS} | Reverse capacitance | - | 0.4 | - | | |
| Q _G | Total gate charge | - | 7 | - | nC | V _{DS} =400V, V _{GS} =0V to 10V, I _D =1A |
| Q _{GS} | Gate-source charge | - | 2.1 | - | | |
| Q _{GD} | Gate-drain charge | - | 0.9 | - | | |
| Q _{OSS} | Output charge | - | 9 | - | nC | V _{GS} =0V, V _{DS} =0V to 400V, f=1MHz |
| t _{D(on)} | Turn-on delay | - | 6 | - | 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 | - | 15 | - | | |
| t _{D(off)} | Turn-off delay | - | 7 | - | | |
| t _F | Fall time | - | 14 | - | | |



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} =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 | |



Typical Characteristics

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

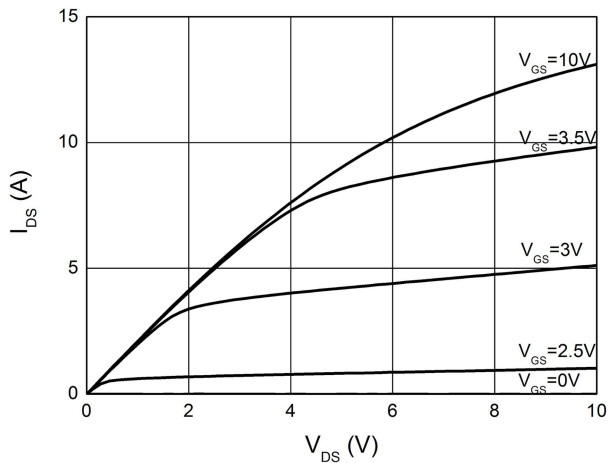


Figure 1. Typical Output Characteristics $T_J=25^\circ\text{C}$

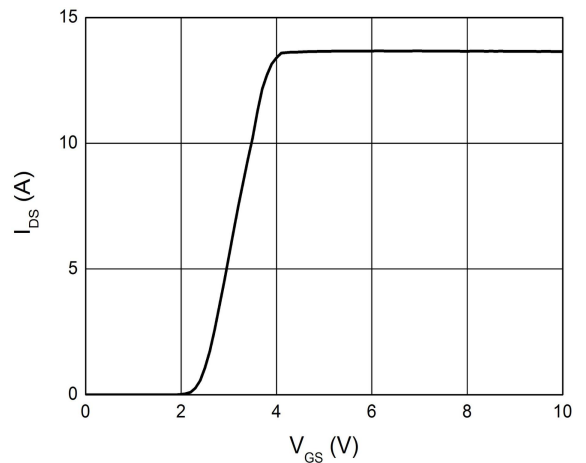


Figure 2. Typical Transfer Characteristics $T_J=25^\circ\text{C}$ ($V_{DS}=10V$)

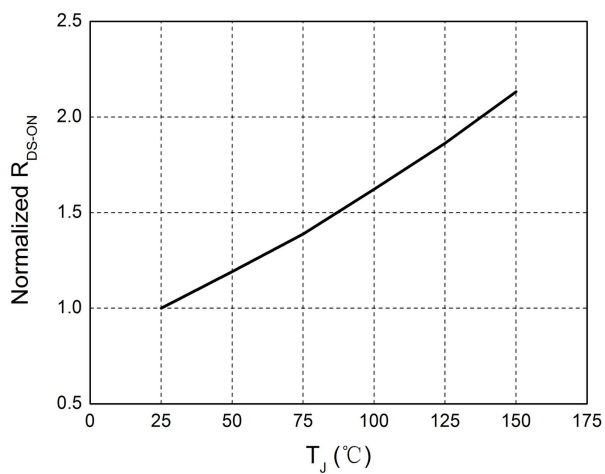


Figure 3. Normalized On-resistance



Typical Characteristics

T_J=25°C unless otherwise stated

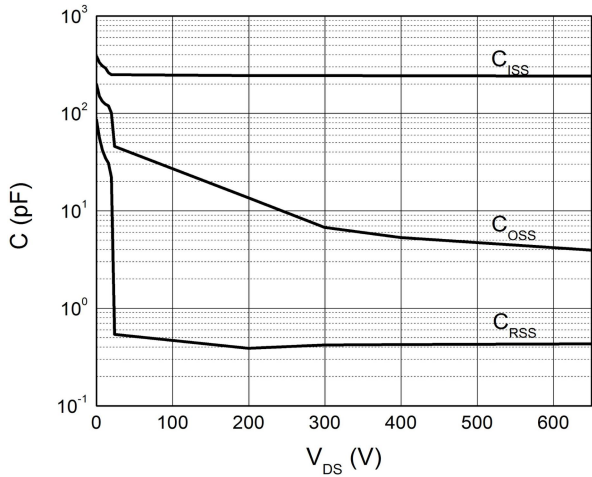


Figure 4. Typical Capacitance (f=1MHz)

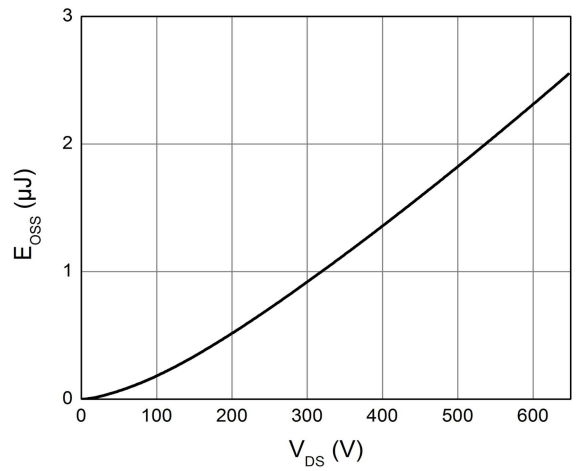


Figure 5. Typical C_{OSS} Stored Energy

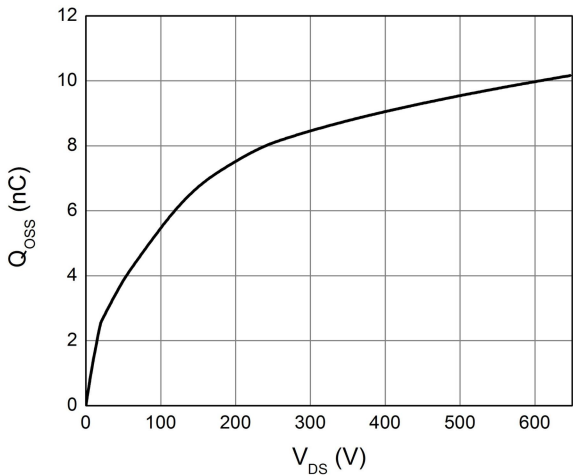


Figure 6. Typical Q_{OSS}

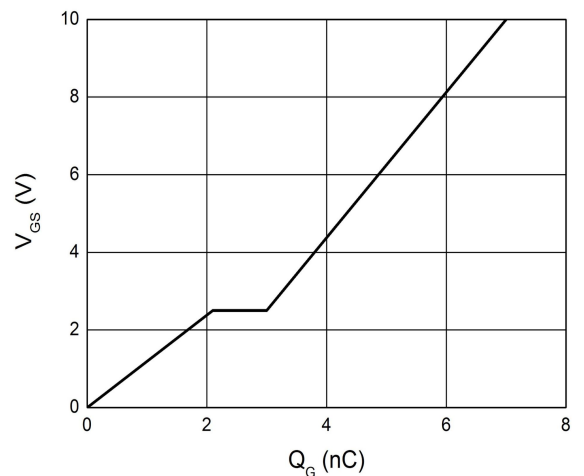


Figure 7. Typical Gate Charge (V_{DS}=400V, I_D=1A)



Typical Characteristics

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

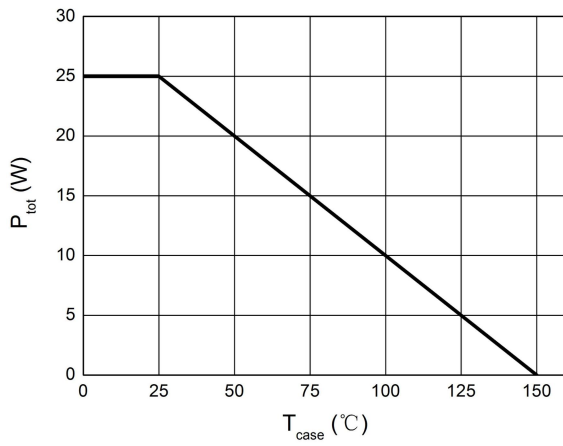


Figure 8. Power Dissipation

Typical Characteristics

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

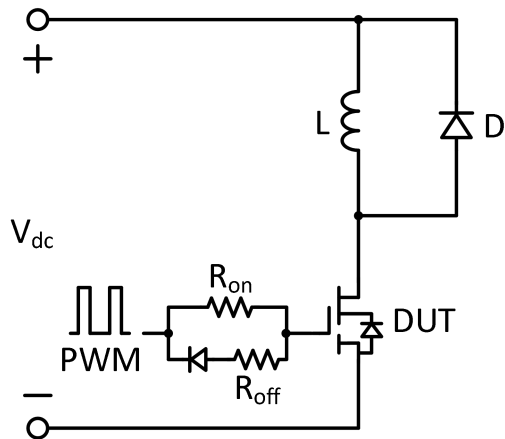


Figure 9. Switching times with inductive load

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

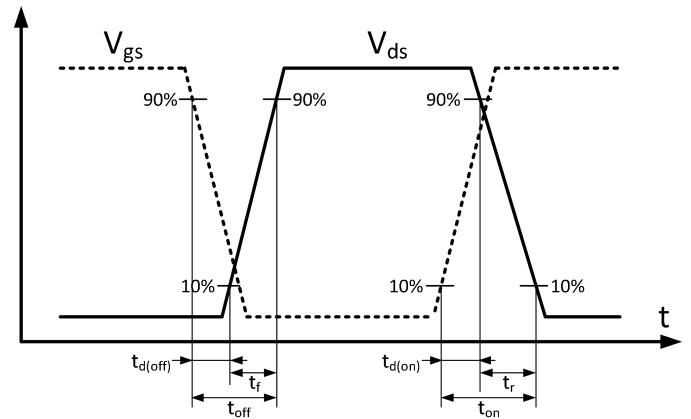
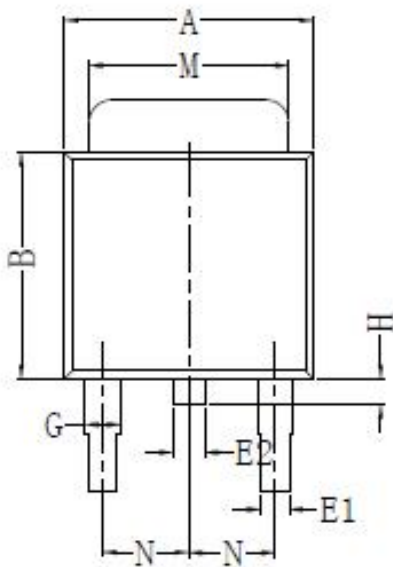


Figure 10. Switching times with waveform

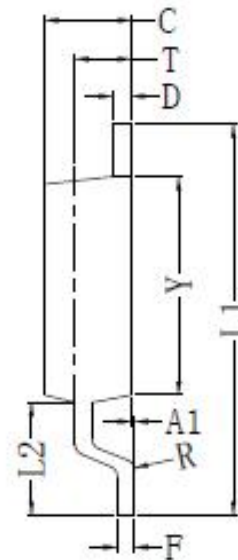
PACKAGE DIMENSIONS

TO252-2L

Top view



Side view



| Symbol | Min. (mm) | Max. (mm) |
|--------|--------------|--------------|
| A | 6.30 | 6.90 |
| A1 | 0.00 | 0.16 |
| B | 5.70 | 6.30 |
| C | 2.10 | 2.50 |
| D | 0.30 | 0.70 |
| E1 | 0.60 | 0.90 |
| E2 | 0.70 | 1.00 |
| F | 0.30 | 0.60 |
| G | 0.70 | 1.20 |
| L1 | 9.40 | 10.50 |
| L2 | 2.70 | 3.10 |
| H | 0.40 | 1.00 |
| M | 5.10 | 5.50 |
| N | 2.09 | 2.49 |
| R | 0.30 | |
| T | 1.40 | 1.60 |
| Y | 5.10 | 6.30 |