

Enhancement Mode Gallium Nitride (GaN) HEMT

100 V, 1.9 mΩ, 275 A, En-FCLGA 5.0x6.0

Preliminary Document NTLEF2D5N10GN1

Features

- Low $R_{DS(ON)}$ to Minimize Conduction Losses
- Ultra Low Gate Charge for High Speed Switching
- $FOM-Q_G = 20.9 \text{ nC}\cdot\text{m}\Omega$
- Small Footprint for High Density PCB Design
- Pb-Free, Halide Free and RoHS Compliant

Typical Applications

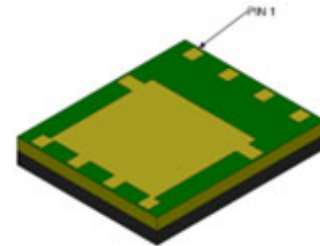
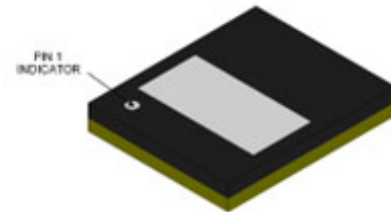
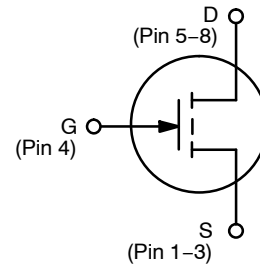
- High Density Power Modules
- High Frequency DC-DC Converters
- High Power Synchronous Rectifiers
- Motor Drivers

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	100	V
Drain-to-Source Transient Voltage, $t_P < 100 \mu\text{s}$	$V_{DS(TRAN)}$	120	V
Gate-to-Source Voltage	V_{GS}	-4 to 6	V
Gate-to-Source Transient Voltage, $t_P = 100 \text{ ns}$, $f_P = 100 \text{ kHz}$, open drain	$V_{GS(PULSE)}$	6.5	V
Continuous Drain Current, $T_{CASE} = 25^\circ\text{C}$ $T_{CASE} = 100^\circ\text{C}$	I_{DS}	275 174	A
Pulsed Drain Current, $t_P < 100 \mu\text{s}$, $T_J = 25^\circ\text{C}$ $T_J = 150^\circ\text{C}$	$I_{DS(PULSE)}$	540 420	A
Power Dissipation, $V_{GS} = 5 \text{ V}$, $T_{CASE} = 25^\circ\text{C}$	P_{TOT}	378	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

$V_{(BR)DSS}$	$R_{DS(ON)}$ TYP	I_{DS} MAX
100 V	1.9 mΩ	275 A



En-FCLGA 5.0 x 6.0 mm
CASE TBD

ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

This Preliminary document is for informational purposes only. onsemi may update or withdraw it without notice. Content and referenced products are under development and subject to change.

NTLEF2D5N10GN1

THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Junction-to-Cases	$R_{\theta JC}$	0.3	$^{\circ}\text{C}/\text{W}$
Junction-to-Board	$R_{\theta JB}$	3.6	$^{\circ}\text{C}/\text{W}$
Junction-to-Ambient (Note 1)	$R_{\theta JA}$	40	$^{\circ}\text{C}/\text{W}$
Maximum Soldering Temperature (MSL3)	T_{SLD}	260	$^{\circ}\text{C}$

1. Device on 1 in², 2 oz copper pad on single layer FR-4 PCB.

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$	100			V
Drain-to-Source Leakage Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V}$		1.4	TBD	μA
		$V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V}, T_J = 125^{\circ}\text{C}$		300		
Gate-to-Source Leakage Current	I_{GSS}	$V_{GS} = 6\text{ V}, V_{DS} = 0\text{ V}$		1.4	TBD	μA
		$V_{GS} = 6\text{ V}, V_{DS} = 0\text{ V}, T_J = 125^{\circ}\text{C}$		30		μA

ON CHARACTERISTICS

Drain-to-Source On Resistance	$R_{DS(ON)}$	$V_{GS} = 5\text{ V}, I_{DS} = 40\text{ A}$		1.9	2.5	m Ω
		$V_{GS} = 5\text{ V}, I_{DS} = 40\text{ A}, T_J = 125^{\circ}\text{C}$		3.0		
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_{DS} = 10\text{ mA}, T_J = 25^{\circ}\text{C}$		1.2		V
		$V_{DS} = V_{GS}, I_{DS} = 10\text{ mA}, T_J = 125^{\circ}\text{C}$		1.1		

DYNAMIC CHARACTERISTICS

Input Capacitance	C_{ISS}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1394		pF		
Output Capacitance	C_{OSS}			566				
Reverse Transfer Capacitance	C_{RSS}			8.8				
Output Capacitance, Energy Related	$C_{OSS(ER)}$	$V_{DS} = 0\text{ V to } 50\text{ V}, V_{GS} = 0\text{ V}$		790		pF		
Output Capacitance, Time Related	$C_{OSS(TR)}$			1119				
Output Charge	Q_{OSS}			56			nC	
Output Capacitance Stored Energy	E_{OSS}			1.0			μJ	
Gate Resistance	R_G		$f = 5\text{ MHz}$		0.7			Ω
Gate Charge	Q_G		$V_{DS} = 50\text{ V}, I_{DS} = 40\text{ A}, V_{GS} = 0/5\text{ V}$		11			nC
Gate-to-Source Charge	Q_{GS}				2.6			
Gate-to-Drain Charge	Q_{GD}			1.7				
Gate Plateau Voltage	V_{PLAT}			1.9		V		

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{D(ON)}$	$V_{DS} = 50\text{ V}, I_{DS} = 40\text{ A}, V_{GS} = 0/5\text{ V}, R_G = 4\ \Omega$		TBD		ns
Turn-Off Delay Time	$t_{D(OFF)}$			TBD		ns
Turn-On Rise Time	t_R			TBD		ns
Turn-Off Fall Time	t_F			TBD		ns

REVERSE CONDUCTION CHARACTERISTICS

Source-to-Drain Reverse Voltage	V_{SD}	$V_{GS} = -3\text{ V}, I_{SD} = 40\text{ A}$		4.9		V
		$V_{GS} = 0\text{ V}, I_{SD} = 40\text{ A}$		1.9		
		$V_{GS} = 5\text{ V}, I_{SD} = 40\text{ A}$		0.08		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NTLEF2D5N10GN1

GATE DRIVE GUIDELINES

This GaN device utilizes a Schottky gate structure, which behaves similarly to a MOSFET with a purely capacitive input and does not require continuous gate current during the on-state. For optimal performance, apply a low-impedance gate driver with appropriate gate resistance to control switching speed and limit ringing. A typical gate voltage of

5 – 6 V is recommended, with optional negative gate bias for hard-switching applications to improve dv/dt immunity and prevent false turn-on. Minimize gate loop inductance (<1 nH) through careful PCB layout and short connections. For additional robustness, Zener clamps may be used to limit gate voltage in both polarities.

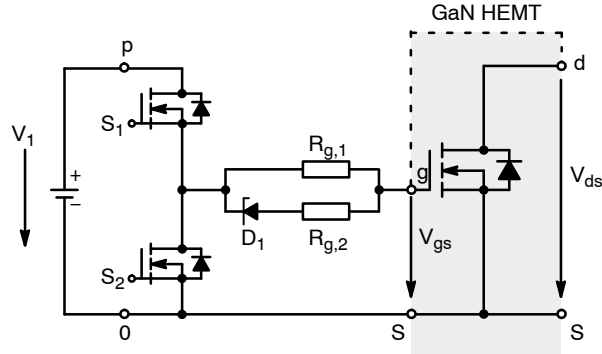


Figure 1. Schottky Gate Conventional Driver Schematic

ORDERING INFORMATION

Device Order Number	Package Type	Shipping
ENGNTLEF2D5N10GN1TXG	En-FCLGA 5.0 x 6.0	TBD

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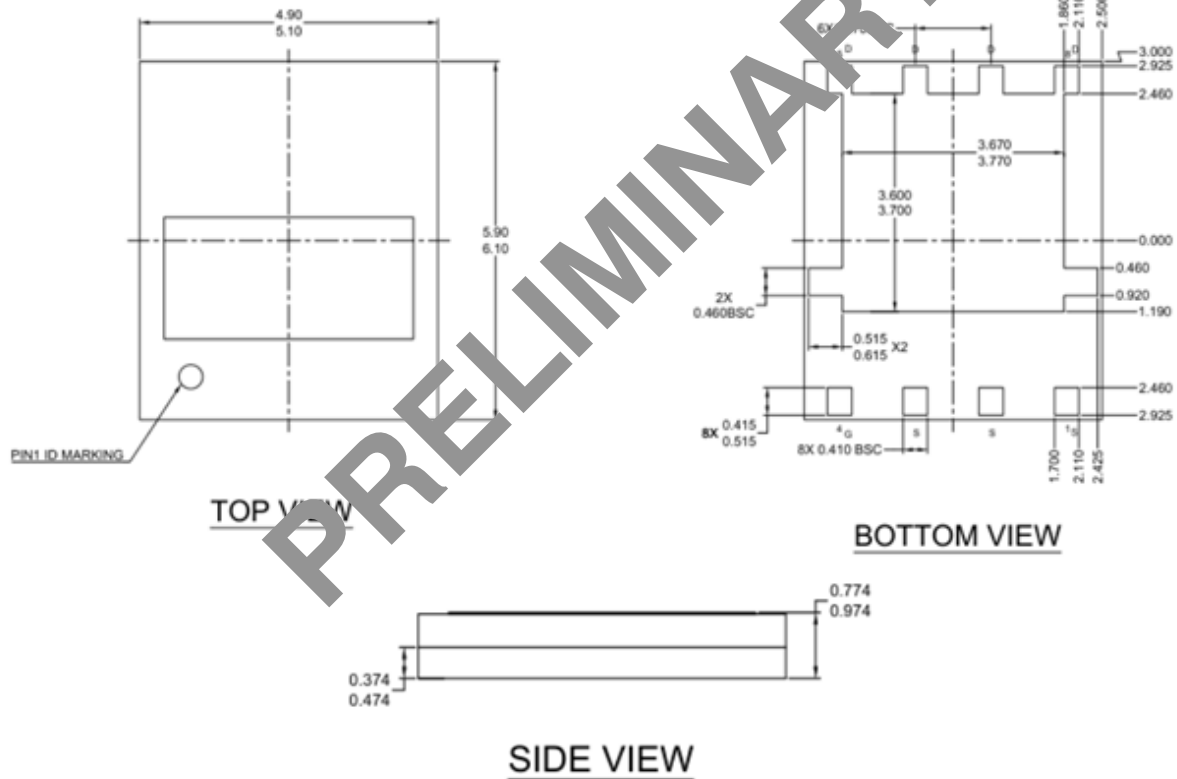
REVISION HISTORY

Revision	Description of Changes	Date
P0	Initial Preliminary document release.	4/3/2026

NTLEF2D5N10GN1

PACKAGE DIMENSIONS

En-FCLGA 5.0 x 6.0 mm
CASE TBD
ISSUE TBD



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