



GaNPower International Inc.

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230 -3410 LOUGHEED HWY  
VANCOUVER, BC, V5M 2A4 CANADA

# GPI65015TO

N-channel 650V 15A GaN Power HEMT in TO220 Package

Datasheet version: 2.3

## Features

$BV_{dss}$	$R_{dson}$	$I_{ds}$	$Q_g$
700 V	92 m $\Omega$	15 A	3.3 nC

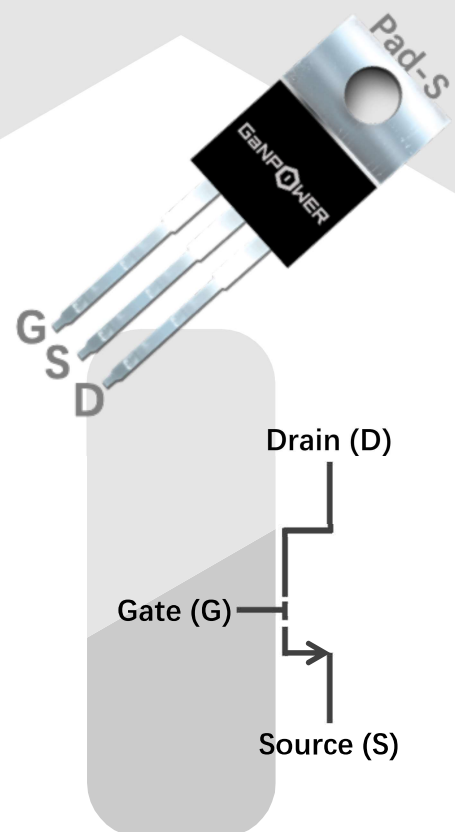
- Ultra-low  $R_{DS(on)}$
- High  $dv/dt$  capability
- Extremely low input capacitance
- Zero  $Q_{rr}$
- Outstanding switching performance
- Low Profile

## Applications

- Switching Power Applications
- Adapters, Quick Chargers

## Description

These devices are N-channel 650 V Power GaN HEMTs based on proprietary E-mode GaN on silicon technology. The resulting product has extremely low on state resistance, very low input capacitance and zero reverse recovery charge making it especially suitable for applications which require superior power density, ultra-high switching frequency and outstanding efficiency.





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## Device Characteristics

Static Parameters				Test data			
	Parameters		Conditions	Min	Typical	Max	Unit
1	$V_{gs(TH)}$	Gate threshold voltage	$V_{ds}=V_{gs}$ $I_d=10\text{mA}$	0.9	1.2	2.9	V
2	$BV_{dss}$	Drain-Source breakdown voltage	$V_{gs}=0V$ $I_d<25\mu A$		700		V
3	$I_{dss}$	Zero gate voltage drain current, $T_c=25^\circ C$	$V_{gs}=0V$ $V_{ds}=650V$		0.1	23	$\mu A$
4	$I_{gss}$	Gate-Source Leakage @ $25^\circ C$	$V_{gs}=6V$ $V_{ds}=0V$		40	1500	$\mu A$
5	$R_{dson}$	Static drain-source on resistance, $T_c=25^\circ C$	$V_{gs}=6V$ $I_d=3\text{A}$		92	110	m $\Omega$
6	$V_{sd}$	Reverse conduction voltage	$I_{sd}=0.4A$ $V_{gs}=0V$	1.2	1.8	3.0	V
7	$R_g$	Gate resistance	$f=25\text{MHz}$ , Open drain		1.65		$\Omega$
Dynamic Parameters				Test data			
	Parameters		Conditions	Min	Typical	Max	Unit
1	$C_{iss}$	Input capacitance	$V_{gs}=0V$		123		pf
	$C_{oss}$	Output capacitance	$V_{ds}=400V$		29		pf
	$C_{rss}$	Reverse transfer capacitance	$f=1\text{MHz}$		4		pf
3	$Q_g$	Gate charge	$V_{ds}=400V$		3.3		nC
	$Q_{gs}$	Gate to source charge	$I_d=7.5A$		0.5		nC
	$Q_{gd}$	Gate to drain charge	$V_{gs}=6V$		0.8		nC
2	$Q_{rr}$	Reverse recovery charge			0		nC
Switching Performance				Test data			
	Parameters		Conditions	Min	Typical	Max	Unit
1	$t_{d(on)}$	Turn-on delay time	$V_{ds}=400V$		5.3		ns
2	$t_r$	Rise time	$I_d=2.5A$		12		ns
3	$t_{d(off)}$	Turn-off delay time	$R_g=10\Omega$		18		ns
4	$t_f$	Fall time	$V_{gs}=6V$		13		ns

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## Absolute Max. Ratings

	Symbols	Parameters	Value	Unit
1	$V_{DS-max}$	Breakdown voltage transient @ $T_{case}=25^{\circ}C$	800	V
2	$V_{GS-max}$	Gate to source max. transient voltage @ $T_{case}=25^{\circ}C$	-12 to +7.5	V
3	$I_{ds-max}$	Drain to source DC current @ $T_{case}=25^{\circ}C$	15	A
4	$I_{ds-max}$	Drain to source DC current @ $T_{case}=100^{\circ}C$	12	A
5	$dv/dt-max$	Drain to source voltage slew rate	200	V/nS
6	$T_J-max$	Max junction temperature	150	$^{\circ}C$
7	$T_S-storage$	Storage temperature	-55 to 150	$^{\circ}C$

## Thermal and Soldering Characteristics (Typical)

	Symbols	Parameters	Value	Unit
1	$R_{thJC}$	Thermal resistance (junction to case)	1.2	$^{\circ}C/W$
2	$R_{thJA}$	Thermal resistance (junction to ambient)	60	$^{\circ}C/W$
2	$T_{solder}$	Reflow soldering temperature	260	$^{\circ}C$

## Ordering

Order Code	Package Type	Packaging Method	Qty
GPI65015TO	TO-220-3		

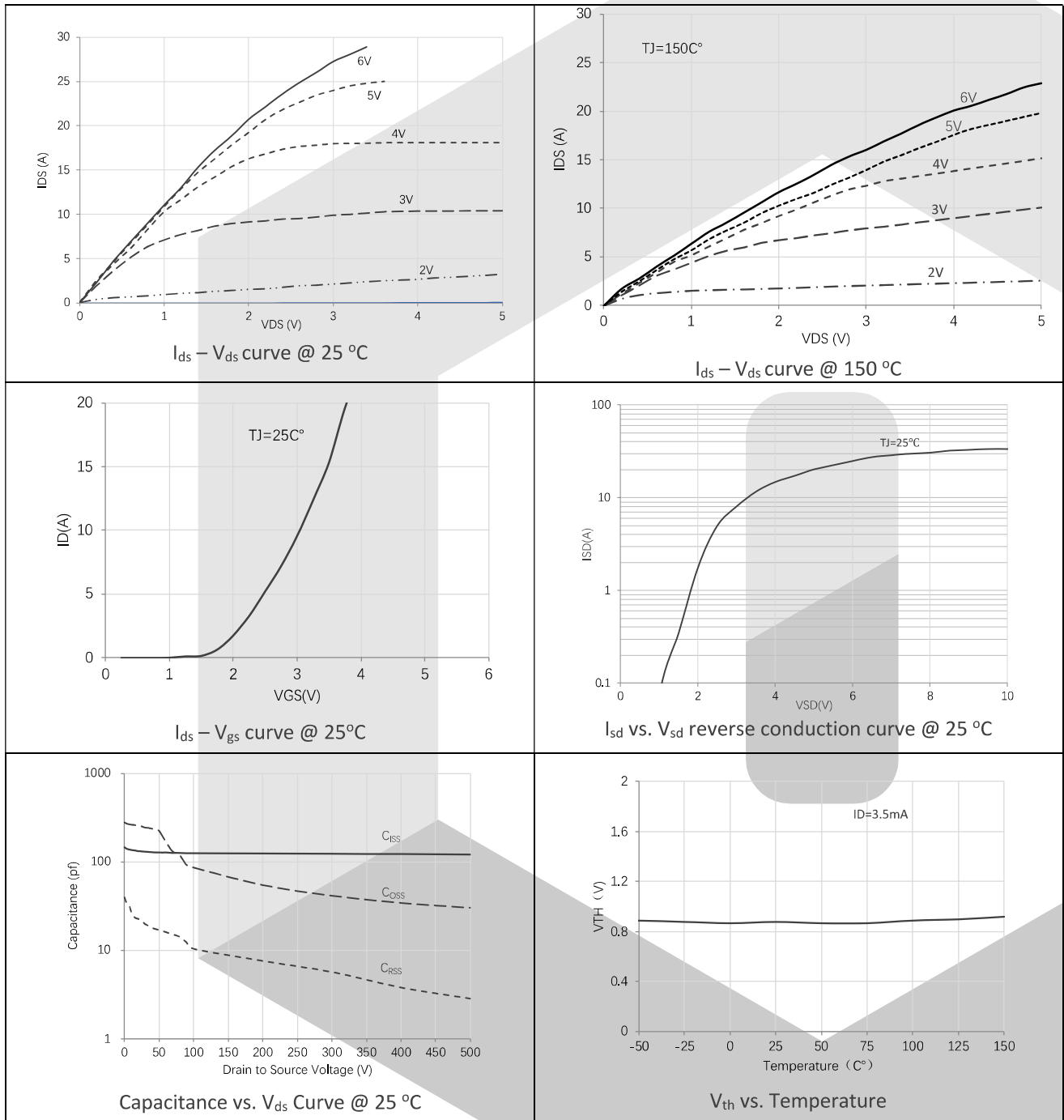
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## Electrical Performance

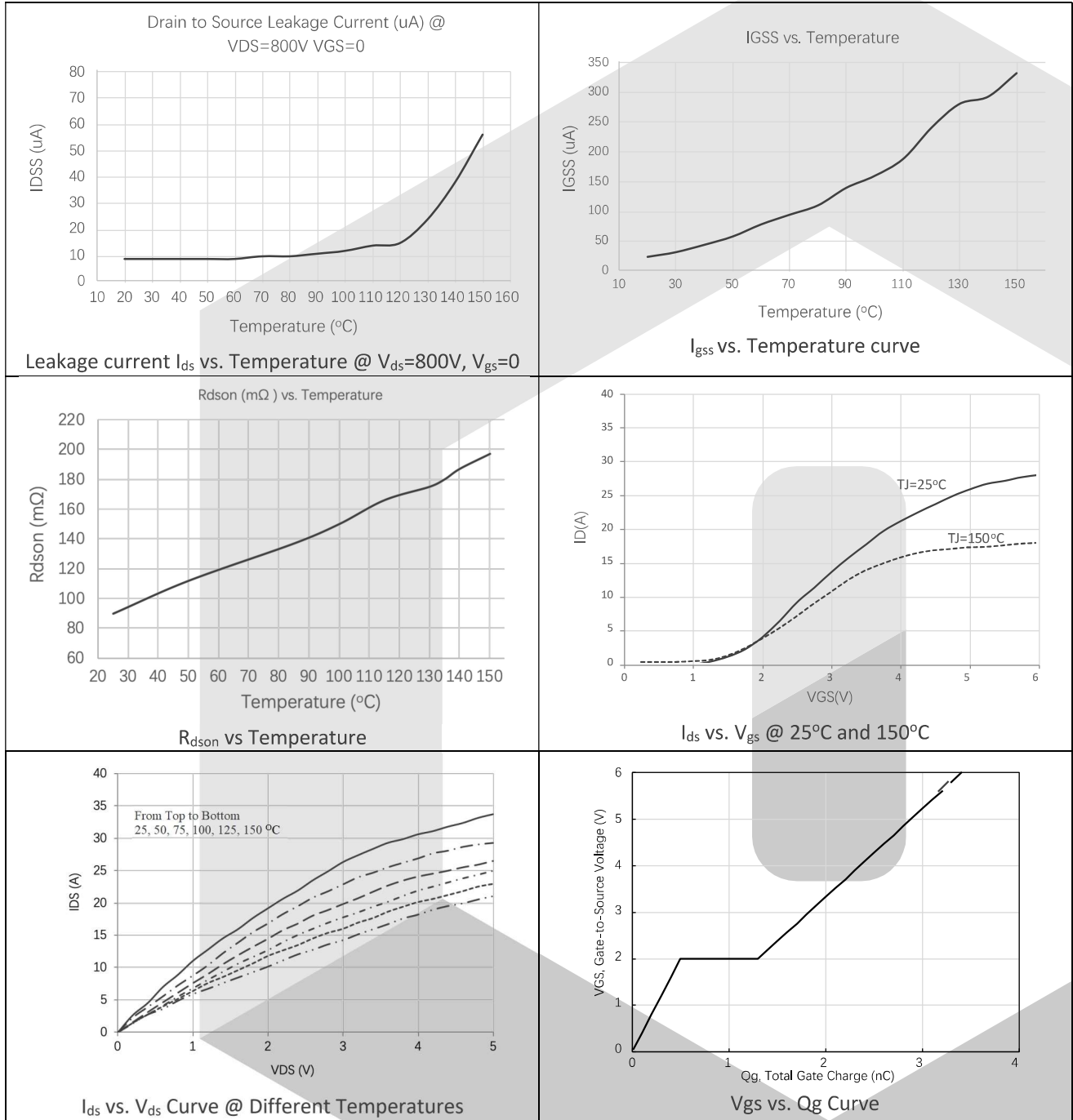


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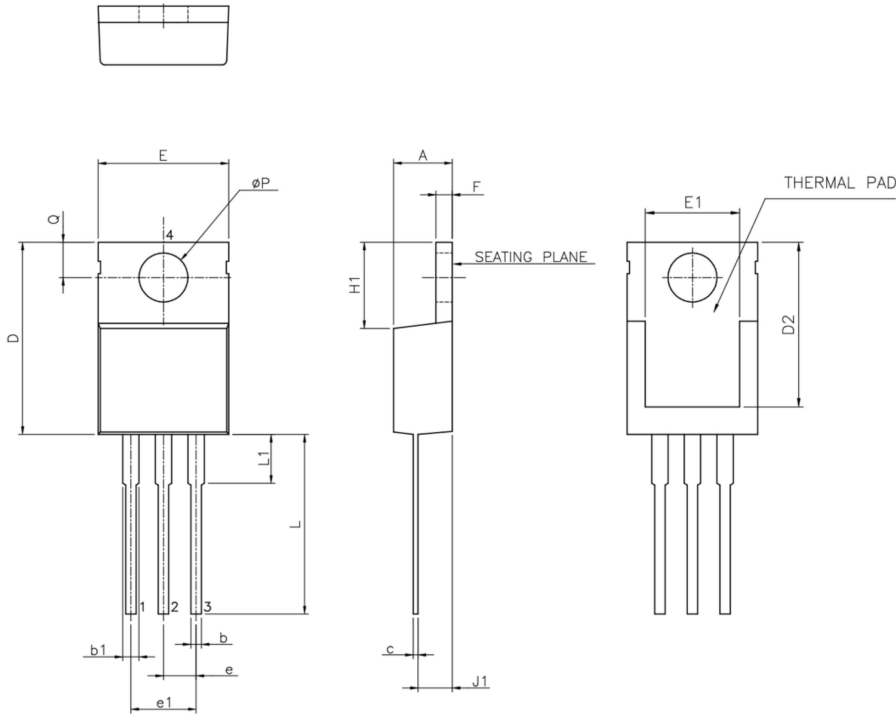
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## Package Information



VARIATIONS (ALL DIMENSIONS SHOWN IN MM)

SYMBOLS	MIN.	MAX.
A	3.56	4.82
b1	1.15	1.77
b	0.38	1.01
c	0.35	0.61
D	14.23	16.51
E	9.66	10.66
D2	11.75	11.90
E1	6.86	8.90
e	2.29	2.79
e1	4.83	5.33
F	0.51	1.39
H1	5.85	6.85
J1	2.04	2.92
L	12.70	14.73
$\phi P$	3.54	4.08
Q	2.54	3.42
L1	3.65	6.35

NOTES:

1. JEDEC OUTLINE : N/A.



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## Further Information

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**Data Source**– Data here are based on recent tests but all parameters may not be up to date. Actual final test data from packaging production are available for selected customers upon request.