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

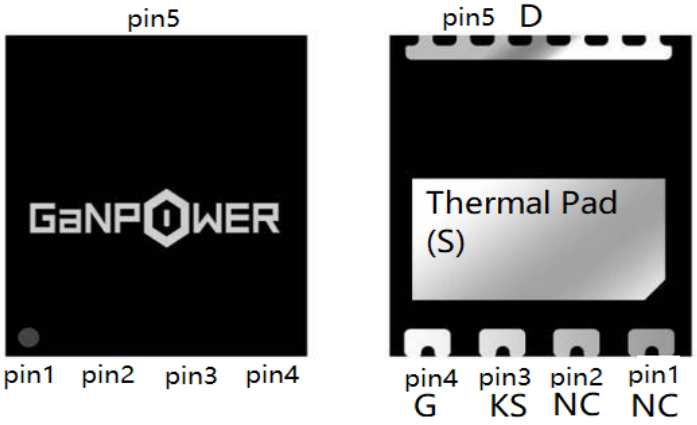
GPI65007DF

N-channel 650V 7A GaN Power HEMT in DFN 5X6 Package

Datasheet version 3.0 Preliminary

Features

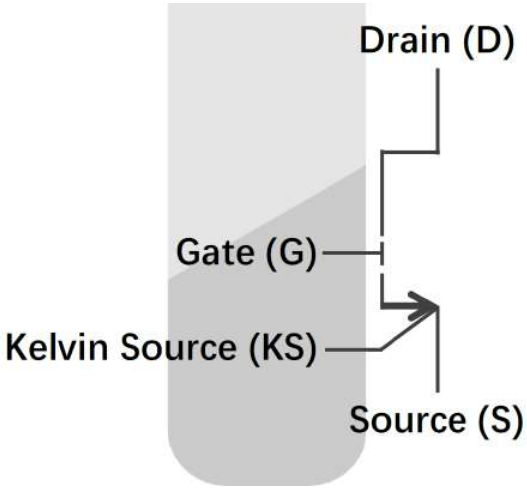
BV_{dss}	R_{dson}	I_{ds}	Q_g
700 V	170 mΩ	7 A	2.1 nC



- Ultra-low R_{DS}(on)
- High dv/dt capability
- Extremely low input capacitance
- Zero Qrr
- 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=5mA (T_J=25 °C)	0.9	1.2	2.9	V
			$V_{ds}=V_{gs}$, I_d=5mA (T_J=150 °C)		1.15		V
2	BV_{dss}	Drain-Source breakdown voltage	V_{gs}=0V, I_d < 20 μA (T_J=25 °C)		700		V
3	I_{dss}	Zero gate voltage drain leakage current	V_{gs}=0V, V_{ds}= 650V T_J = 25 ℃		0.01	12	μA
4	I_{gss}	Gate-Source Leakage	V_{gs} = 6V, V_{ds} = 0V		19	700	μA
5	R_{dson}	drain-source on resistance	V_{gs}=6V, I_d=1.4A T_J = 25 °C		170	225	mΩ
			V_{gs}=6V, I_d=1.4A T_J= 150 °C		360		mΩ
6	V_{sd}	Reverse conduction voltage	I_{sd}=0.2A, V_{gs}=0V	1.2	1.9	3	V
7	R_g	Gate resistance	f=25Mhz Open drain		1.5		Ω
Dynamic Parameters				**Test data**			
	Parameters		**Conditions**	**Min**	**Typical**	**Max**	**Unit**
1	C_{ISS}	Input capacitance	V_{gs} = 0V V_{ds} = 400V F = 1MHz		76.1		pf
2	C_{OSS}	Output capacitance			20.9		pf
3	C_{RSS}	Reverse transfer capacitance			0.42		pf
4	CO(er)	Effective output capacitance, energy related	Vds = 0 - 400V		35		pf
5	Q_g	Gate charge	Vds = 400V Id = 1.75A Vgs = 6V		2.1		nC
6	Q_{gs}	Gate to source charge			0.4		nC
7	Q_{gd}	Gate to drain charge			0.52		nC
8	QOSS	Output Charge	Vds = 0 - 400V		22		nC
9	Q_{rr}	Reverse recovery charge			0		nC

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Switching Performance				Test data			
	Parameters		**Conditions**	**Min**	**Typical**	**Max**	**Unit**
1	$t_{d(on)}$	Turn-on delay time	V_{ds} = 400V I_d = 1.75A R_g = 10Ω V_{gs} = 6V		4		ns
2	t_r	Rise time			8		ns
3	$t_{d(off)}$	Turn-off delay time			14		ns
4	t_f	Fall time			8		ns

Absolute Max. Ratings

	Symbols	**Parameters**	**Value**	**Unit**
1	$V_{DS\text{-}max}$	Breakdown voltage transient @ T_{case}=25°C	800	V
2	$V_{DS\text{-}max}$	Breakdown voltage transient @ T_{case}=125°C	650	V
3	$V_{GS\text{-}max}$	Gate to source max. voltage @ T_{case}=25°C	-12 to +7.5	V
4	$I_{ds\text{-}max}$	Drain to source pulse current @ T_{case}=25°C, pulse width 10 µs, V_{GS} = 6 V	16	A
5	$I_{ds\text{-}max}$	Drain to source pulse current @ T_{case}=100°C	7	A
6	$dv/dt_{\text{-}max}$	Drain to source voltage slew rate	200	V/ns
7	$T_{J\text{-}max}$	Max junction temperature	150	°C
8	$T_{S\text{-}storage}$	Storage temperature	-55 to 150	°C

Thermal and Soldering Characteristics (Typical)

	Symbols	**Parameters**	**Value**	**Unit**
1	R_{thJC}	Thermal resistance (junction to case)	2.2	°C /W
2	R_{thJA}	Thermal resistance (junction to ambient)	62	°C /W
3	T_{solder}	Reflow soldering temperature	250	°C

Ordering

Order Code	**Package Type**	**Packaging Method**	**Qty**
GPI65007DF	DFN surface mount, bottom cooled, 5X6 mm		

Electrical Performance

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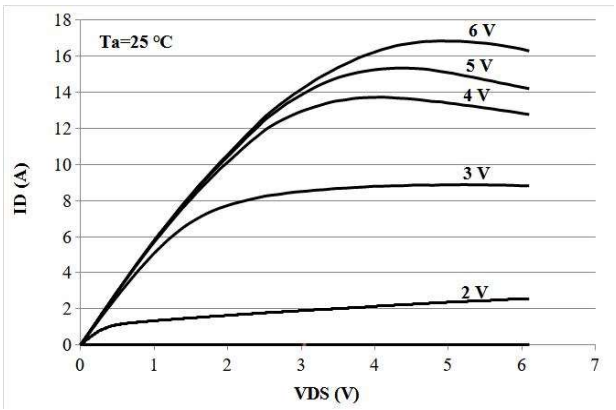
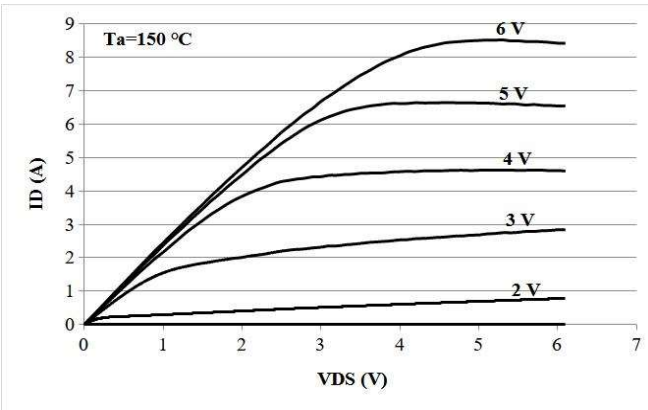
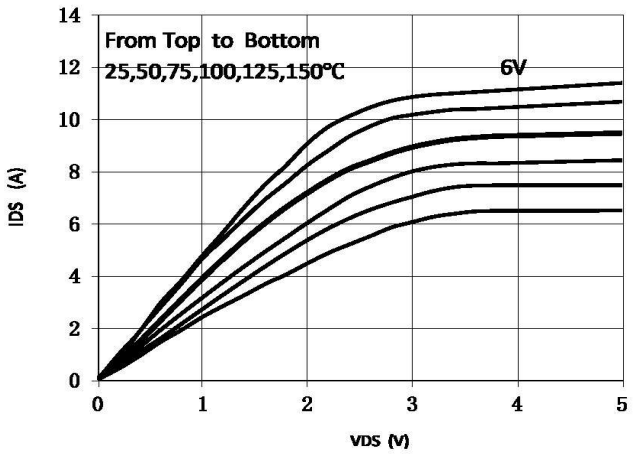


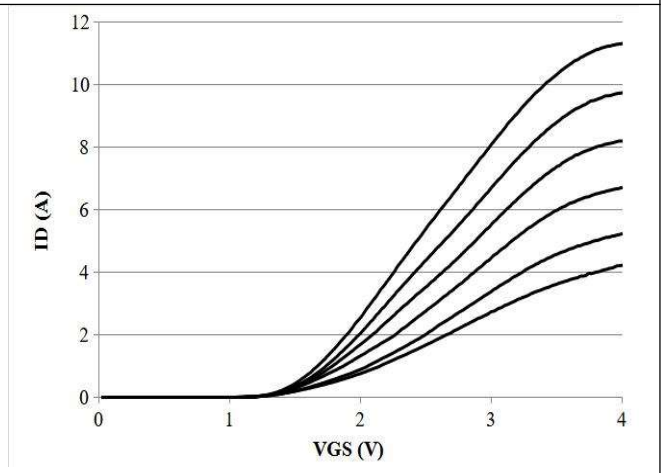
I_{DS} vs. V_{DS} @ T_j = 25 °C



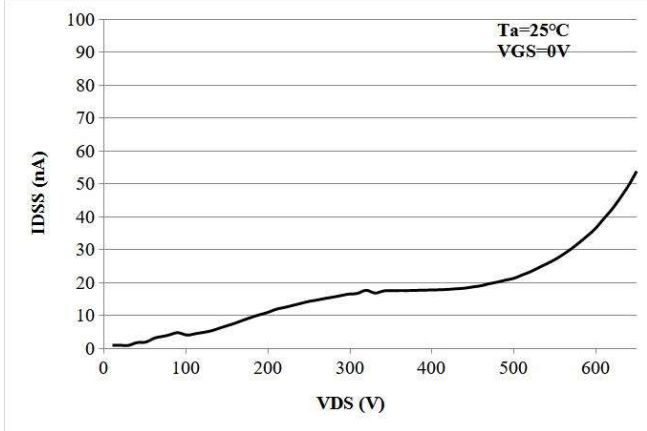
I_{DS} vs. V_{DS} @ T_j = 150 °C



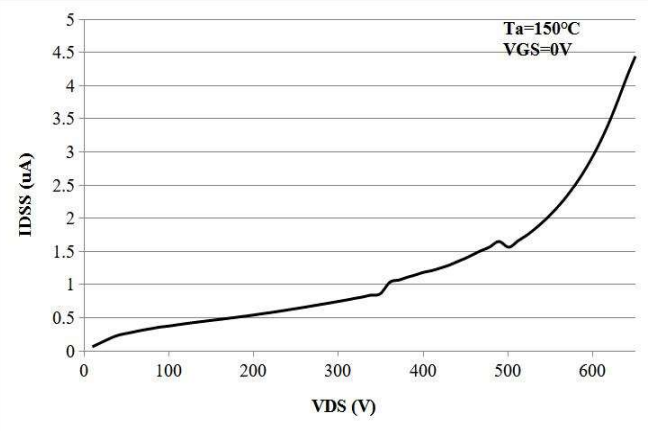
I_{DS} vs. V_{DS} @ V_{GS} = 6V, T_J=25-150 °C



I_{DS} vs. V_{GS} @ T_j = 25 °C-150 °C, step25 °C



Breakdown voltage @ T_j = 25 °C, V_{GS}=0 V



Breakdown voltage @ T_j = 150 °C, V_{GS}=0 V

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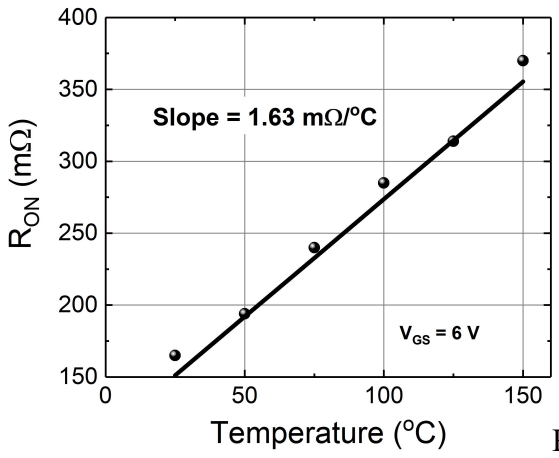
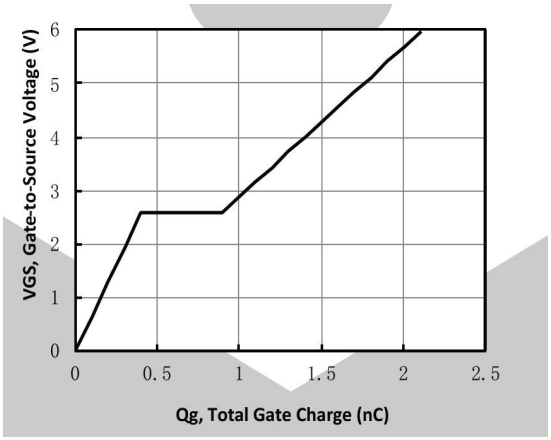
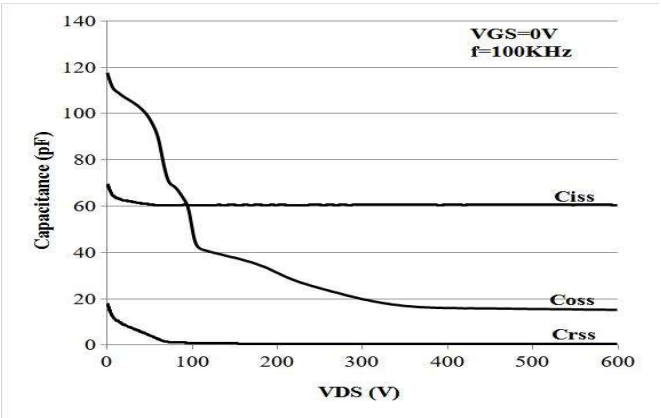


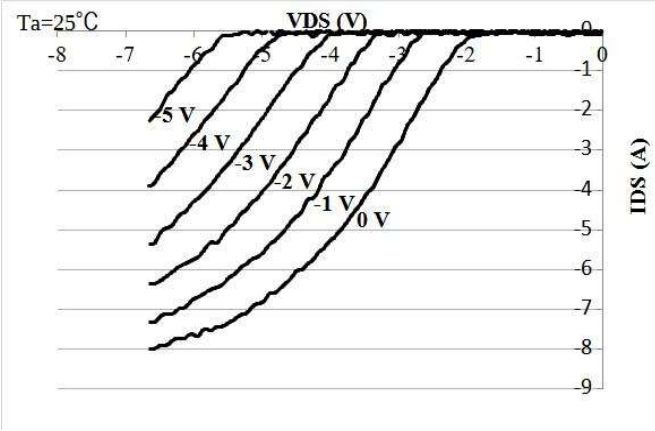
R_{on} vs. T_J @ I_D = 1.75 A, V_{GS} = 6V



Q_G-V_{GS} curve



Capacitance vs. V_{ds} Curve @ T_j=25 °C



I_{SD} vs. V_{SD} reverse conduction curve @ T_j = 25 °C

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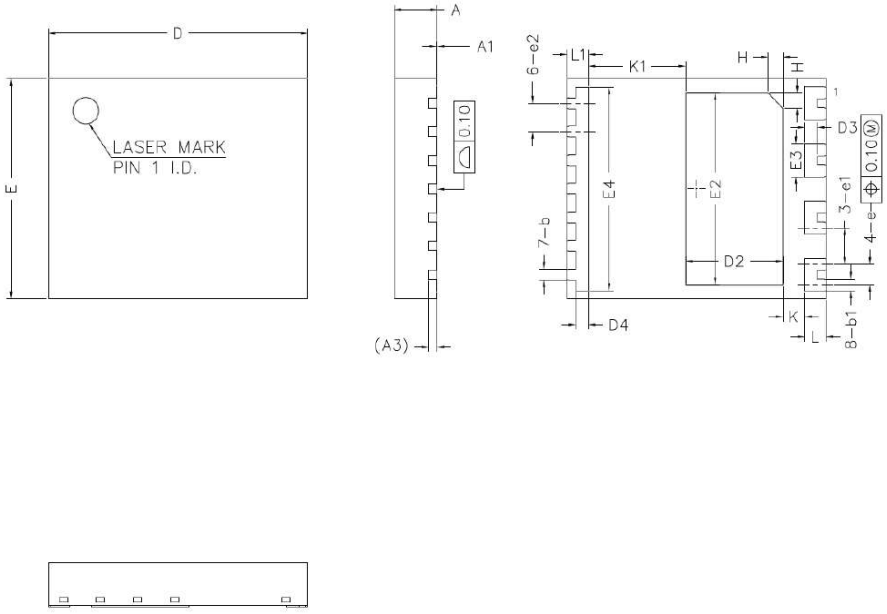
Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.00	0.02	0.05
A3		0.203REF	
b	0.20	0.25	0.30
b1	0.225	0.275	0.325
D	5.90	6.00	6.10
E	4.90	5.00	5.10
D2	2.15	2.25	2.35
E2	4.27	4.37	4.47
D3	0.20	0.30	0.40
E3	0.65	0.75	0.85
D4	0.20	0.30	0.40
E4	4.525	4.625	4.725
e	0.375	0.475	0.575
e1	0.725	0.825	0.925
e2	0.55	0.65	0.75
H		0.35REF	
K	0.35	0.50	0.65
K1	2.10	2.25	2.40
L	0.40	0.50	0.60
L1	0.40	0.50	0.60

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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.