

GPI90005DF88

N-channel 900V 5A GaNPower HEMT in DFN 8X8 Package

Datasheet version 1.3 Preliminary

Features

BV_{dss}	R_{dson}	I_{ds}	Q_g
910 V	235 mΩ	5 A (25 °C) 11 A (pulse)	1.6 nC

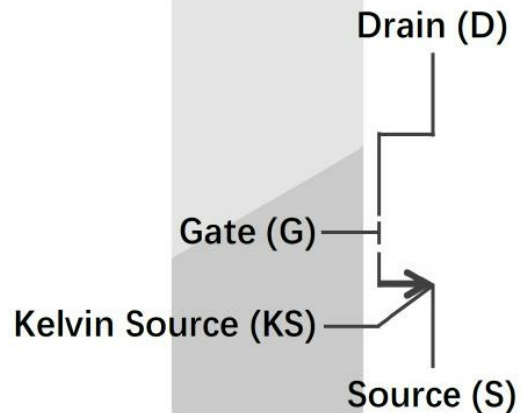
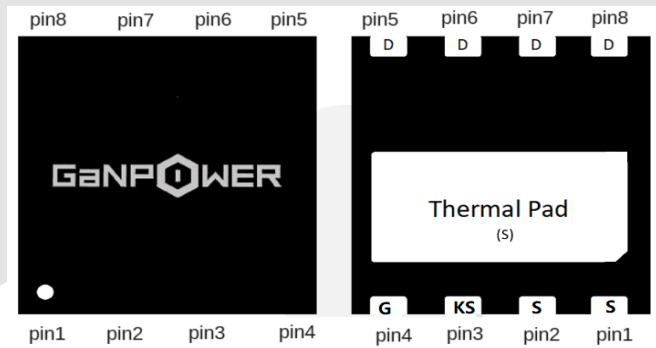
- Ultra-low $R_{DS(on)}$
- High dv/dt capability
- Extremely low input capacitance
- Zero Q_{rr}
- Outstanding switching performance
- Low Profile

Applications

- Switching Power Applications
- Server and Telecom Power Application
- EVOBC and DC-DC Converters
- UPS, Inverters, PV

Description

These devices are N-channel 900V 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.



Device Characteristics

Static Parameters				Test data				
	Parameters		Conditions	Min	Typical	Max	Unit	
1	$V_{gs(TH)}$	Gate threshold voltage	$V_{ds}=V_{gs}, I_d=3.5mA$ ($T_J=25\text{ }^\circ C$)	0.9	1.2	2.9	V	
			$V_{ds}=V_{gs}, I_d=3.5mA$ ($T_J=150\text{ }^\circ C$)		1.1		V	
2	BV_{dss}	Drain-Source breakdown voltage	$V_{gs}=0V, I_d < 20\text{ }\mu A$ ($T_J=25\text{ }^\circ C$)	910			V	
3	I_{dss}	Zero gate voltage drain leakage current	$V_{gs}=0V, V_{ds}= 650V$ $T_J = 25\text{ }^\circ C$		0.7	14	μA	
			$V_{gs}= 0V, V_{ds}= 650V$ $T_J = 150\text{ }^\circ C$		21		μA	
4	I_{gss}	Gate-Source Leakage	$V_{gs} = 6V, V_{ds} = 0V$		4	500	μA	
5	R_{dson}	drain-source on resistance	$V_{gs}=6V, I_d=1A$ $T_J = 25\text{ }^\circ C$		235	320	m Ω	
			$V_{gs}=6V, I_d=1A$ $T_J = 150\text{ }^\circ C$		580		m Ω	
6	V_{sd}	Reverse conduction voltage	$I_{sd}=0.1A, V_{gs}=0V$	1.2	1.4	3	V	
7	R_g	Gate resistance	$f=25MHz$ Open drain		1		Ω	
Dynamic Parameters				Test data				
	Parameters		Conditions	Min	Typical	Max	Unit	
1	C_{ISS}	Input capacitance	$V_{gs} = 0V$ $V_{ds} = 500V$ $f = 100\text{ kHz}$		39		pf	
2	C_{OSS}	Output capacitance				11.8		pf
3	C_{RSS}	Reverse transfer capacitance				0.24		pf
4	$C_{O(er)}$	Effective output capacitance, energy related	$V_{ds} = 0 - 500V$		15		pf	
5	Q_g	Gate charge	$V_{ds} = 500V$ $I_d = 2.5A$ $V_{gs} = 6V$		1.6		nC	
6	Q_{gs}	Gate to source charge				0.30		nC
7	Q_{gd}	Gate to drain charge				0.38		nC
8	Q_{OSS}	Output Charge	$V_{ds} = 0 - 500V$		10		nC	
9	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	$V_{ds} = 600\text{ V}$ $I_d = 1.8\text{ A}$ $R_g = 22/2\ \Omega$ $V_{gs} = -3/6\text{ V}$		5		ns
2	t_r	Rise time			21		ns
3	$t_{d(off)}$	Turn-off delay time			8		ns
4	t_f	Fall time			29		ns
5	E_{on}	Switching energy during turn-on			30		μJ
6	E_{off}	Switching energy during turn-off			3		μJ
7	E_{oss}	Output capacitance stored energy	$V_{ds} = 0 - 500\text{ V}$		1.8		μJ

Absolute Max. Ratings

	Symbols	Parameters	Value	Unit
1	V_{DS-max}	Breakdown voltage transient @ $T_{case}=25^\circ\text{C}$	910	V
2	V_{DS-max}	Breakdown voltage transient @ $T_{case}=125^\circ\text{C}$	910	V
3	V_{GS-max}	Gate to source max. voltage @ $T_{case}=25^\circ\text{C}$	-12 to +7.5	V
4	I_{ds-max}	Drain to source DC continuous current @ $T_{case}=25^\circ\text{C}$	5	A
5	I_{ds-max}	Drain to source pulse current @ $T_{case}=25^\circ\text{C}$, pulse width 10 μs , $V_{GS} = 6\text{ V}$	11	A
6	I_{ds-max}	Drain to source DC current @ $T_{case}=100^\circ\text{C}$	5	A
7	$dv/dt-max$	Drain to source voltage slew rate	150	V/ns
8	T_J-max	Max junction temperature	150	$^\circ\text{C}$
9	$T_S-storage$	Storage temperature	-55 to 150	$^\circ\text{C}$

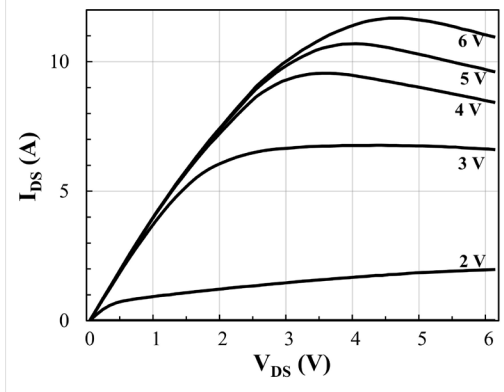
Thermal and Soldering Characteristics (Typical)

	Symbols	Parameters	Value	Unit
1	R_{thJC}	Thermal resistance (junction to case)	1.4	$^\circ\text{C}/\text{W}$
2	R_{thJA}	Thermal resistance (junction to ambient)	62	$^\circ\text{C}/\text{W}$
3	T_{solder}	Reflow soldering temperature	260	$^\circ\text{C}$

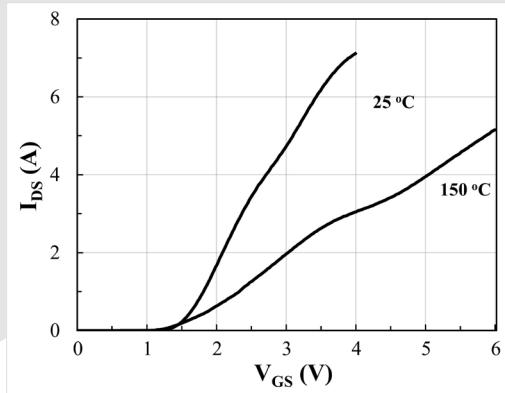
Ordering

Order Code	Package Type	Packaging Method	Qty
GPI90005DF88	DFN8x8		

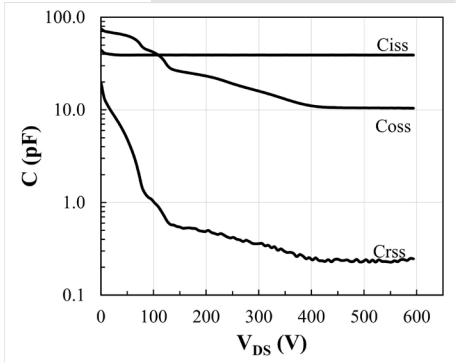
Electrical Performance



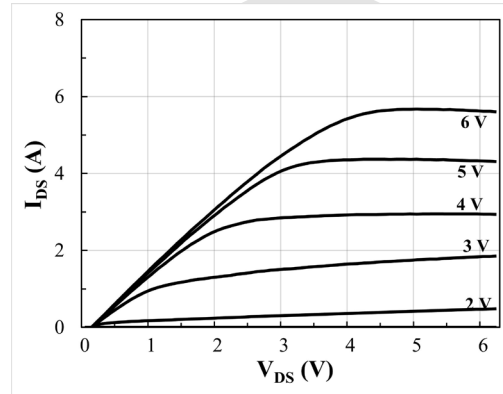
I_{DS} vs. V_{DS} @ $T_j = 25\text{ }^\circ\text{C}$



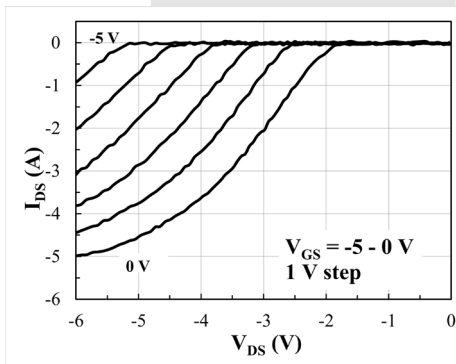
I_{DS} vs. V_{GS} @ $T_j = 25\text{ }^\circ\text{C}$ and $150\text{ }^\circ\text{C}$



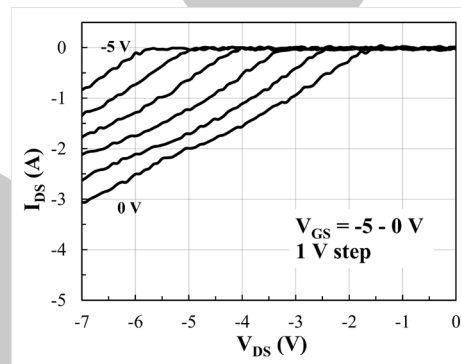
Capacitance vs. V_{ds} Curve @ $T_j = 25\text{ }^\circ\text{C}$



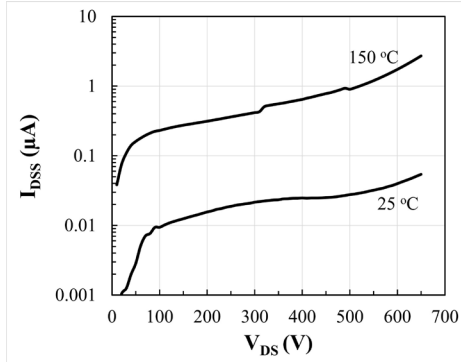
I_{DS} vs. V_{DS} @ $T_j = 150\text{ }^\circ\text{C}$



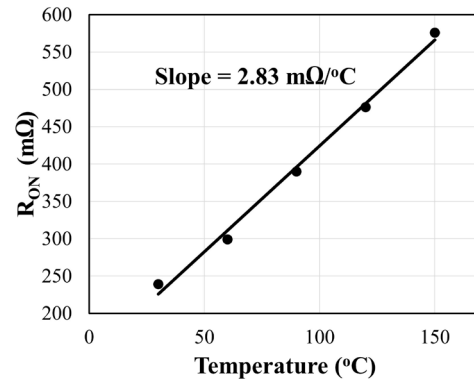
I_{sd} vs. V_{sd} reverse conduction curve @ $T_j = 25\text{ }^\circ\text{C}$



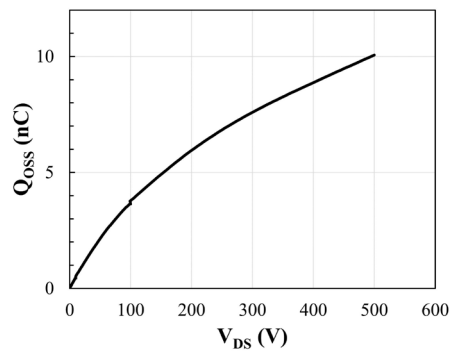
I_{sd} vs. V_{sd} reverse conduction curve @ $T_j = 150\text{ }^\circ\text{C}$



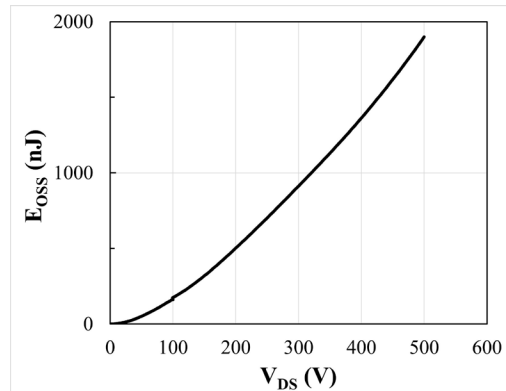
Typical off-state drain leakage current I_{DSS} vs. V_{DS} @ $T_J = 25^\circ C$ and $150^\circ C$



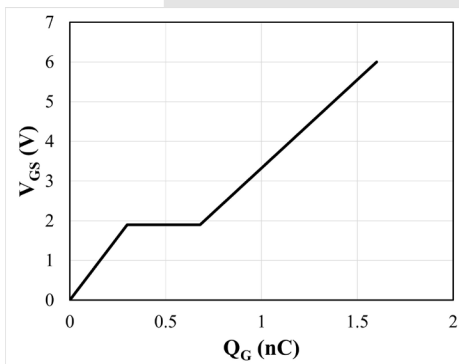
On-state resistance vs. T_J @ $I_D = 2.5 A$, $V_{GS} = 6V$



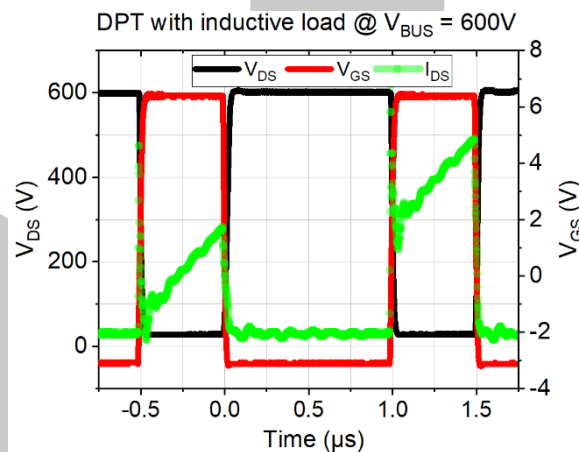
Output charge Q_{OSS} vs. V_{DS}



Stored Energy Characteristic E_{OSS} vs. V_{DS}

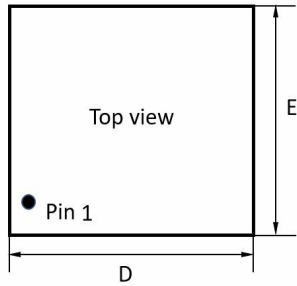


Gate charge V_{GS} vs. Q_G



DPT waveform, 1st off @ 1.8A, 2nd off @ 3.4A

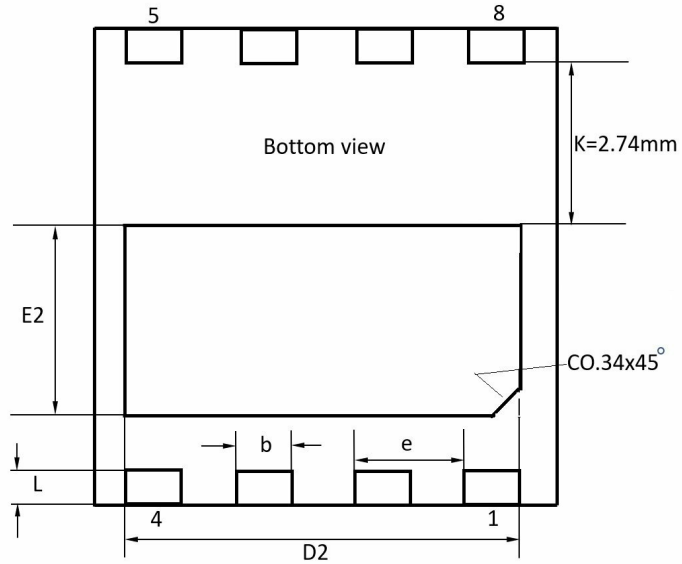
Package Information



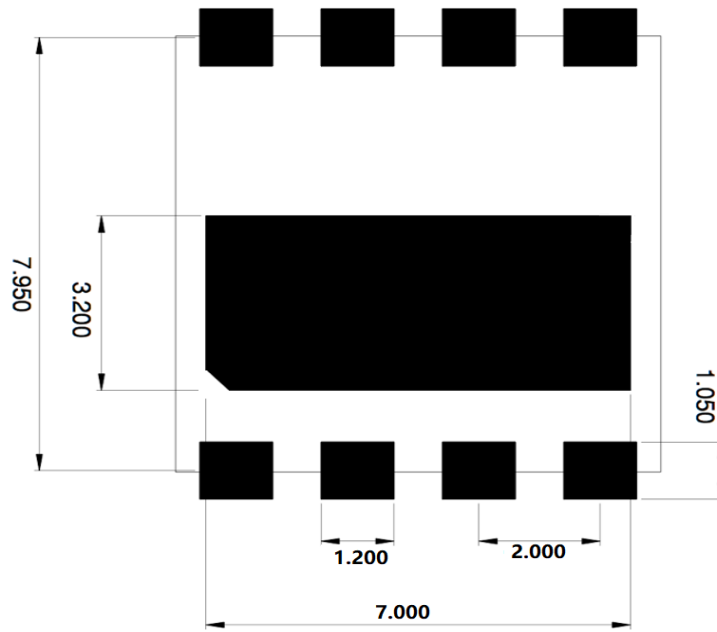
$D=8$; $E=8$; $e=1.95$; $b=0.97$;
 $L=0.57$; $D2=6.82$; $E2=3.19$

8LEAD DFN (8x8x0.75mm,
Pitch 1.95mm)

**IMPORTANT: Please connect
the bottom thermal pad to
the source electrode on PCB**



Land Pattern View





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Further Information

Important Notice-Unless expressly approved in writing by an authorized representative of GaNPower, GaNPower components are not designed, authorized or warranted for use in lifesaving, life sustaining, military, aircraft, or space applications, nor in products or systems where failure or malfunction may result in personal injury, death, or property or environmental damage. The information given in this document shall not in any event be regarded as a guarantee of performance. GaNPower hereby disclaims any or all warranties and liabilities of any kind, including but not limited to warranties of non-infringement of intellectual property rights. All other brand and product names are trademarks or registered trademarks of their respective owners. Information provided herein is intended as a guide only and is subject to change without notice. The information contained herein or any use of such information does not grant, explicitly, or implicitly, to any party any patent rights, licenses, or any other intellectual property rights. All rights reserved.

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.