

GPI65007DF88

N-channel 650V 7A GaN Power HEMT in DFN 8X8 Package

Datasheet version 2.9 Preliminary

Features

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

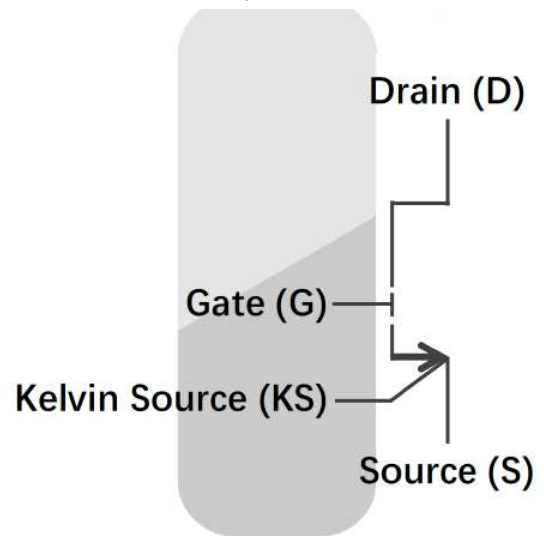
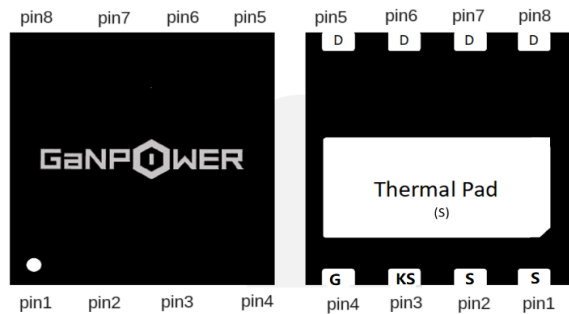
- Ultra-low $R_{DS(on)}$
- High dv/dt capability
- Extremely low input capacitance
- Zero Q_{rr}
- Outstanding switching performance
- Low Profile

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.



Device Characteristics

Static Parameters				Test data				
	Parameters		Conditions	Min	Typical	Max	Unit	
1	$V_{GS(TH)}$	Gate threshold voltage	$V_{ds}=V_{gs}, I_d=5mA$ ($T_j=25\text{ }^\circ\text{C}$)	0.9	1.2	2.9	V	
			$V_{ds}=V_{gs}, I_d=5mA$ ($T_j=150\text{ }^\circ\text{C}$)		1.15		V	
2	BV_{dss}	Drain-Source breakdown voltage	$V_{gs}=0V, I_d < 20\text{ }\mu\text{A}$ ($T_j=25\text{ }^\circ\text{C}$)		650		V	
3	I_{dss}	Zero gate voltage drain leakage current	$V_{gs}=0V, V_{ds}=650V$ $T_j=25\text{ }^\circ\text{C}$		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	$V_{gs}=6V, I_d=1.4A$ $T_j=25\text{ }^\circ\text{C}$		170	225	m Ω	
			$V_{gs}=6V, I_d=1.4A$ $T_j=150\text{ }^\circ\text{C}$		420		m Ω	
6	V_{sd}	Reverse conduction voltage	$I_{sd}=0.2A, V_{gs}=0V$	1.2	2.2	3	V	
7	R_g	Gate resistance	$f=25\text{Mhz}$ Open drain		1.1		Ω	
Dynamic Parameters				Test data				
	Parameters		Conditions	Min	Typical	Max	Unit	
1	C_{ISS}	Input capacitance	$V_{gs}=0V$ $V_{ds}=500V$ $f=100\text{kHz}$		60		pf	
2	C_{OSS}	Output capacitance				16		pf
3	C_{RSS}	Reverse transfer capacitance				0.37		pf
4	CO(er)	Effective output capacitance, energy related	$V_{ds}=0-500V$		22.7		pf	
5	Q_g	Gate charge	$V_{ds}=500V$ $I_d=1.75A$ $V_{gs}=6V$		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	$V_{ds}=0-500V$		18		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	$V_{ds} = 500V$ $I_d = 1.75A$ $R_g = 10\Omega$ $V_{gs} = 6V$		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-max}	Breakdown voltage transient @ $T_{case}=25^{\circ}C$	800	V
2	V_{DS-max}	Breakdown voltage transient @ $T_{case}=125^{\circ}C$	650	V
3	V_{GS-max}	Gate to source max. voltage @ $T_{case}=25^{\circ}C$	-12 to +7.5	V
4	I_{ds-max}	Drain to source pulse current @ $T_{case}=25^{\circ}C$, pulse width 10 μs , $V_{gs} = 6 V$	16	A
5	I_{ds-max}	Drain to source pulse current @ $T_{case}=150^{\circ}C$	7	A
6	$dv/dt-max$	Drain to source voltage slew rate	200	V/ns
7	T_{J-max}	Max junction temperature	150	$^{\circ}C$
8	$T_{S-storage}$	Storage temperature	-55 to 150	$^{\circ}C$

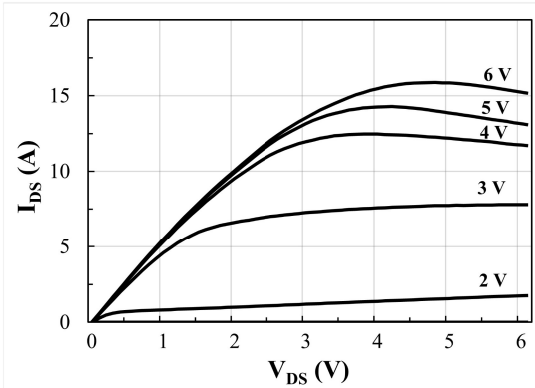
Thermal and Soldering Characteristics (Typical)

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

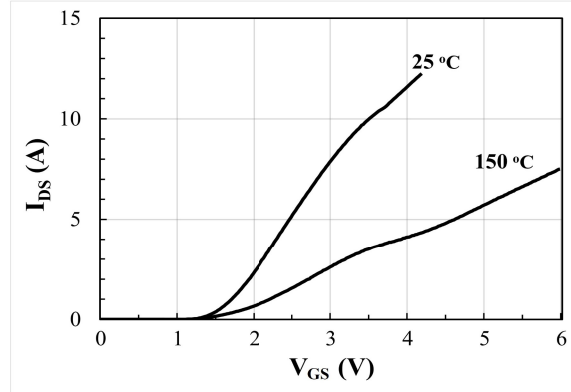
Ordering

Order Code	Package Type	Packaging Method	Qty
GPI65007DF88	DFN surface mount, bottom cooled, 8X8 mm		

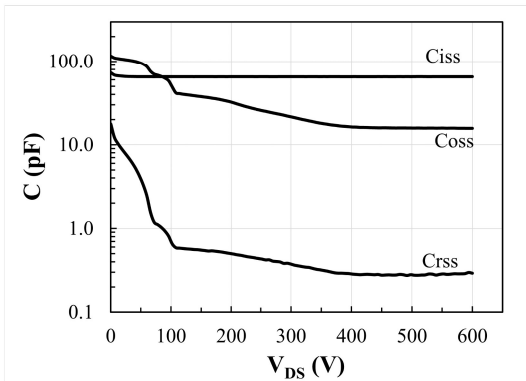
Electrical Performance



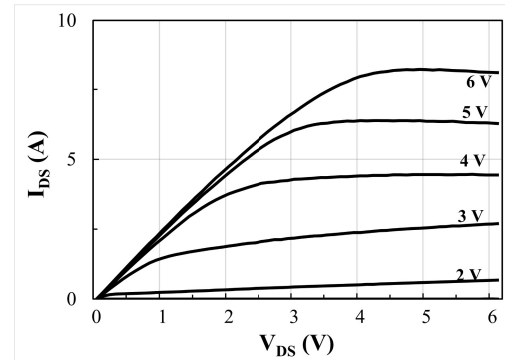
I_{DS} vs. V_{DS} @ $T_j = 25^\circ\text{C}$



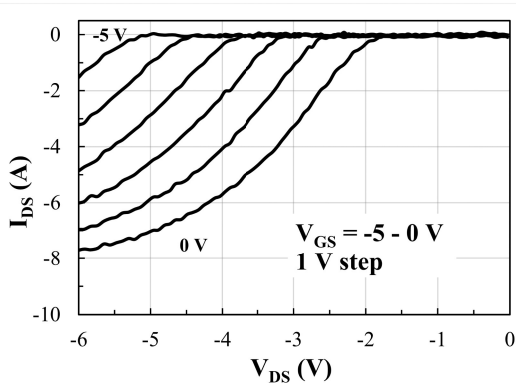
I_{DS} vs. V_{GS} @ $T_j = 25^\circ\text{C}$ and 150°C



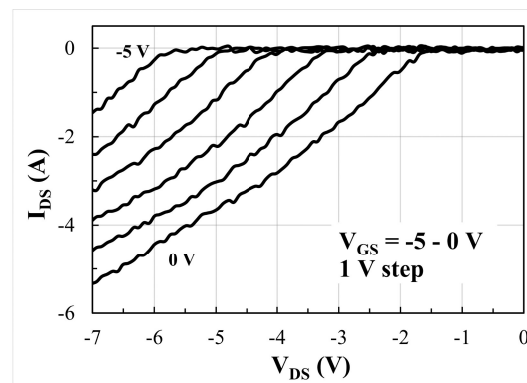
Capacitance vs. V_{ds} Curve @ $T_j = 25^\circ\text{C}$



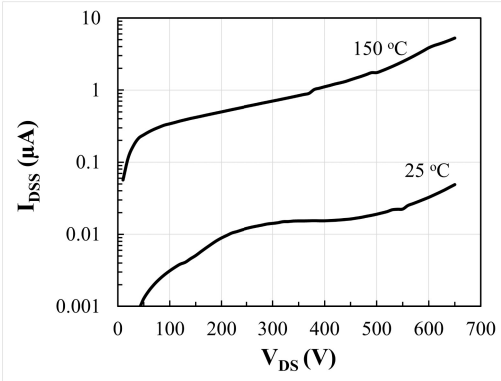
I_{DS} vs. V_{DS} @ $T_j = 150^\circ\text{C}$



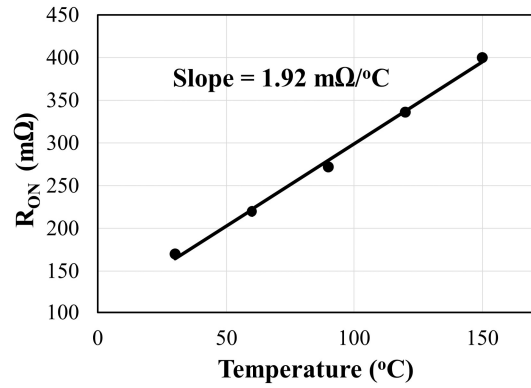
I_{SD} vs. V_{SD} reverse conduction curve @ $T_j = 25^\circ\text{C}$



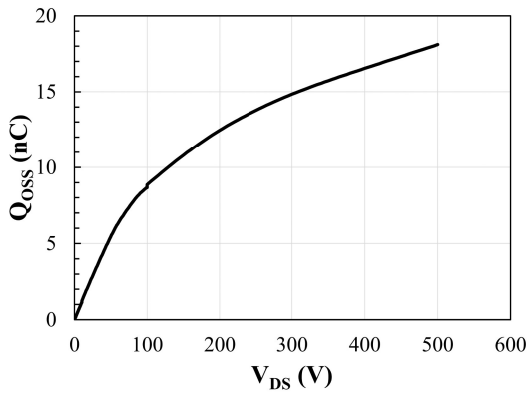
I_{SD} vs. V_{SD} reverse conduction curve @ $T_j = 150^\circ\text{C}$



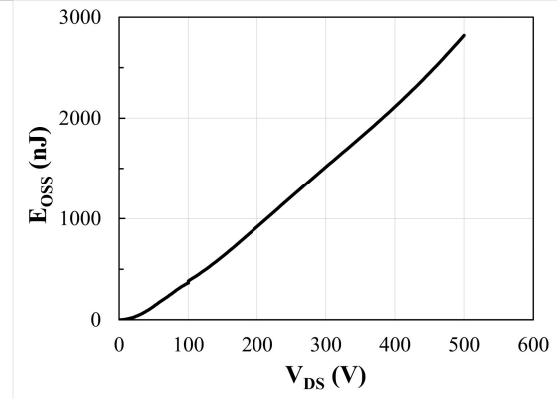
Typical off-state drain leakage current I_{DSS} vs. V_{DS}
 @ $T_J = 25\text{ °C}$ and 150 °C



On-state resistance vs. T_J @ $I_D = 1.75\text{ A}$, $V_{GS} = 6\text{ V}$

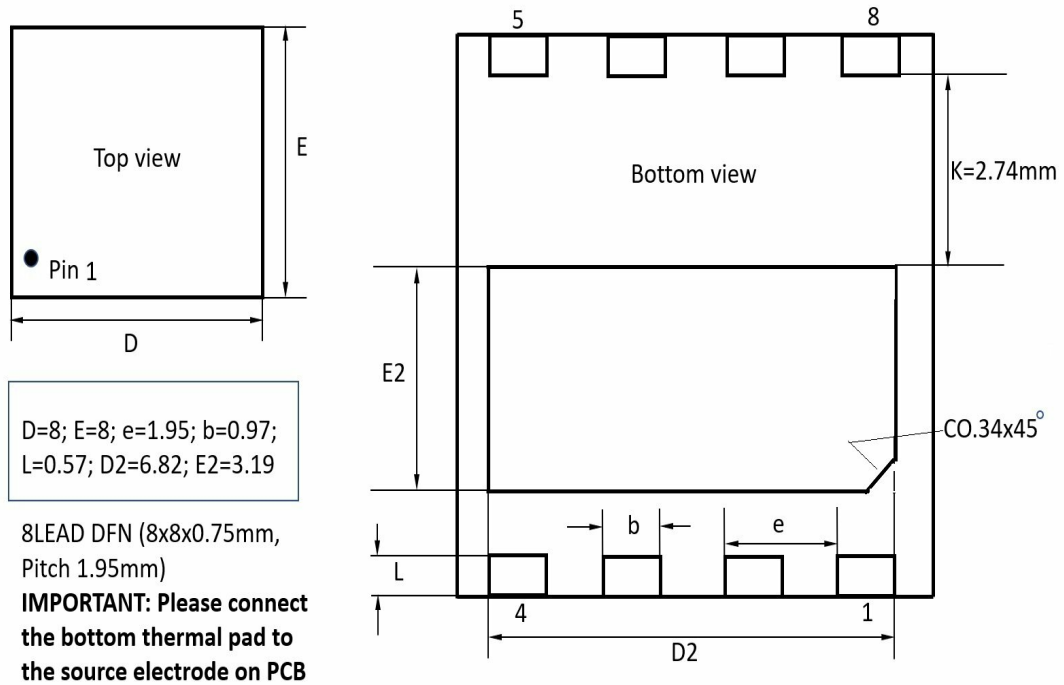


Output charge Q_{OSS} vs. V_{DS}

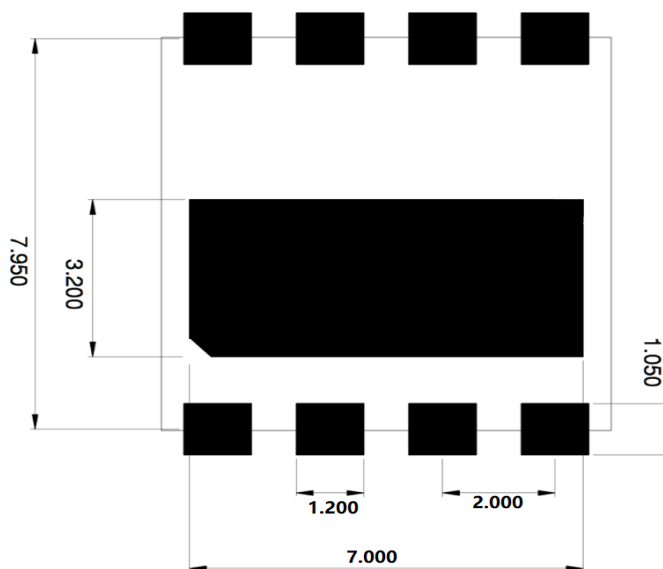


Stored Energy Characteristic E_{OSS}
 vs. V_{DS}

Package Information



Land Pattern View





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Further Information

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