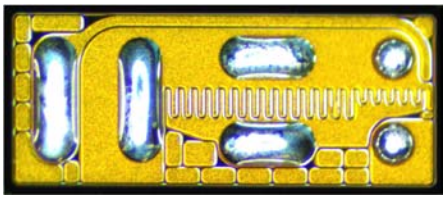
EPC8003 – Enhancement Mode Power Transistor
Preliminary Specification Sheet

Features:

- V_{DS}, 100V
- $R_{DS(on)}$, 300 mΩ
- I_D, 2.5 A
- Optimized eGaN® FET for high frequency applications
- Pb-Free (RoHS Compliant), Halogen Free



EPC8003 eGaN FETs are supplied only in passivated die form with solder bars

Applications:

- Ultra high speed DC-DC conversion
- RF Envelope Tracking
- Wireless Power Transfer
- Game console and industrial movement sensing (LiDAR)

MAXIMUM RATINGS

Parameter	Value
Maximum Drain – Source Voltage	100 V
Gate – Source Maximum Voltage Range	-5 V < V_{GS} < 6 V
Continuous Drain Current, 25 ˚C, θ_{JA} = 33	2.5 A
Maximum Pulsed Drain Current, 25 ˚C, T_{pulse} = 300 µs	5 A
Operating Temperature Range	-40 ˚C < T_J < 125 ˚C

STATIC CHARACTERISTICS

Parameter	Conditions	Value
Maximum Drain – Source Leakage	V_{DS} = 80 V, V_{GS} = 0 V	0.1 mA
$R_{DS(ON)}$	V_{GS} = 5 V, I_D = 0.5 A	300 mΩ
Gate – Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 0.25 mA	0.7 V < $V_{GS(TH)}$ < 2.5 V
Gate – Source Maximum Positive Leakage	V_{GS} = 5 V	0.5 mA
Gate – Source Maximum Negative Leakage	V_{GS} = -5 V	-0.1 mA

T_J = 25 °C unless otherwise stated
Specifications are with Substrate shorted to Source where applicable

DYNAMIC CHARACTERISTICS

Parameter	Conditions	Typical Value
C_{ISS} (Input Capacitance)	V_{DS} = 50 V; V_{GS} = 0 V	38 pF
C_{OSS} (Output Capacitance)		18 pF
C_{RSS} (Reverse Transfer Capacitance)		0.2 pF
Q_G (Total Gate Charge)	V_{DS} = 50 V; I_D = 1 A	315 pC
Q_{GD} (Gate to Drain Charge)		34 pC
Q_{GS} (Gate to Source Charge)		110 pC
Q_{OSS} (Output Charge)	V_{DS} = 50 V; V_{GS} = 0 V	1110 pC
Q_{RR} (Source-Drain Recovery Charge)		0 pC

T_J = 25 °C unless otherwise stated
Specifications are with Substrate shorted to Source where applicable

THERMAL CHARACTERISTICS

		TYP	
$R_{\theta JC}$	Thermal Resistance, Junction to Case	6.7	°C/W
$R_{\theta JB}$	Thermal Resistance, Junction to Board	33	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1)	82	°C/W

Note 1: $R_{\theta JA}$ is determined with the device mounted on one square inch of copper pad, single layer 2 oz copper on FR4 board.
See http://epc-co.com/epc/documents/product-training/Appnote_Thermal_Performance_of_eGaN_FETs.pdf for details.

Figure 1:

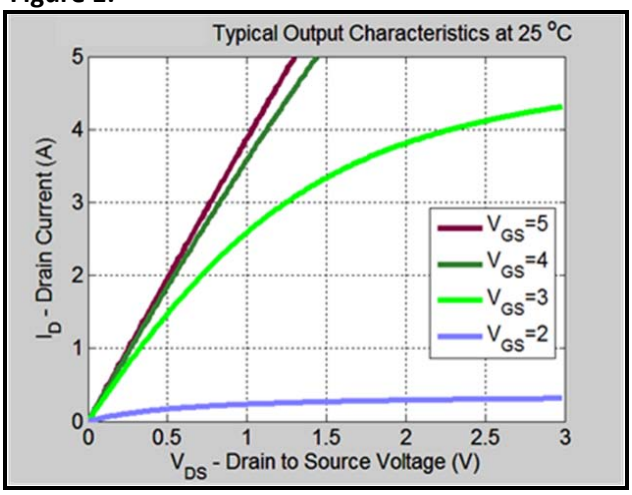


Figure 2:

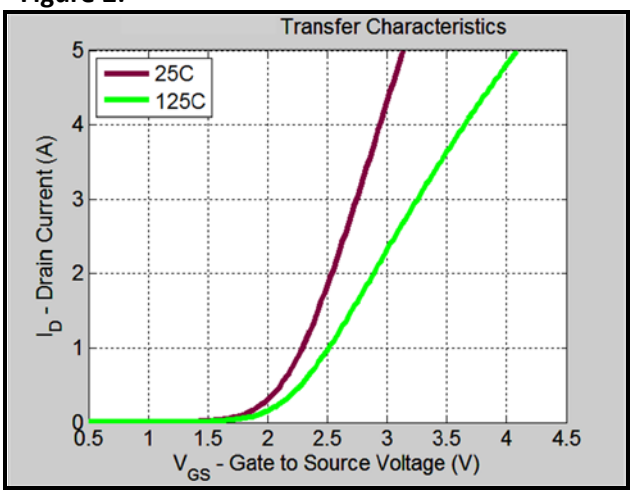


Figure 3:

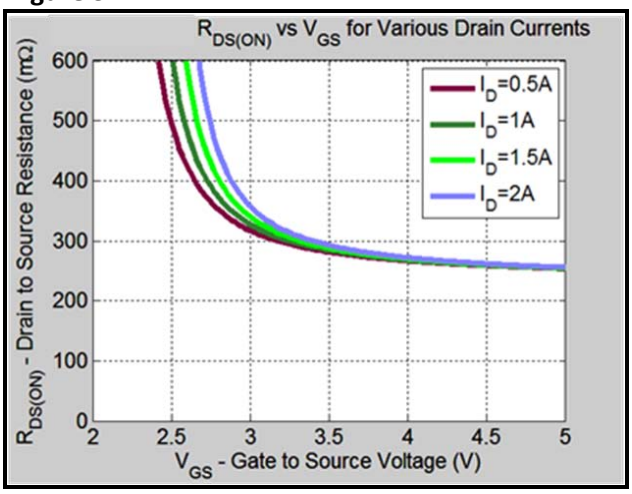


Figure 4:

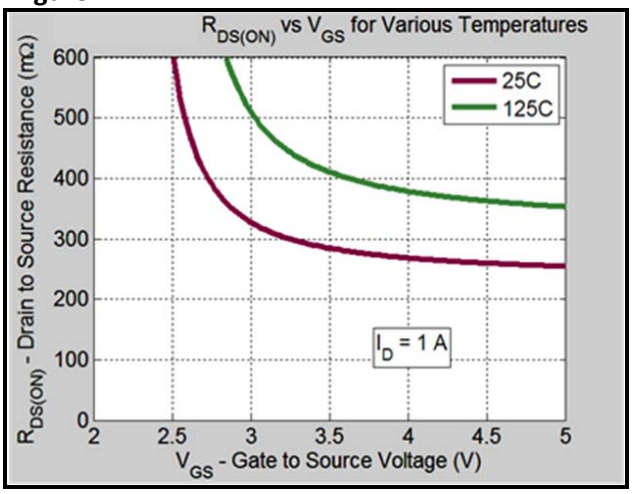
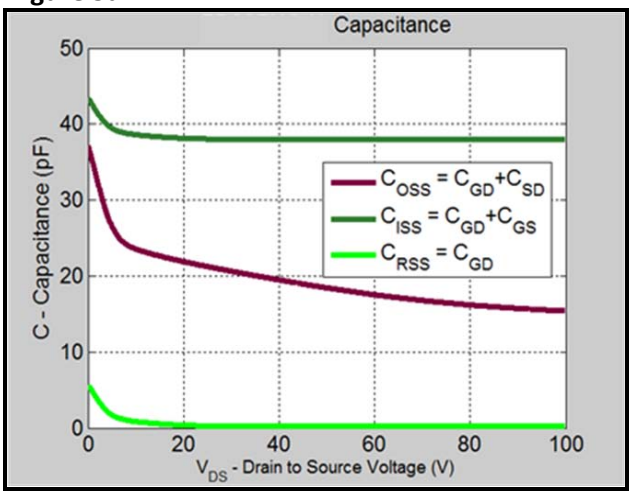
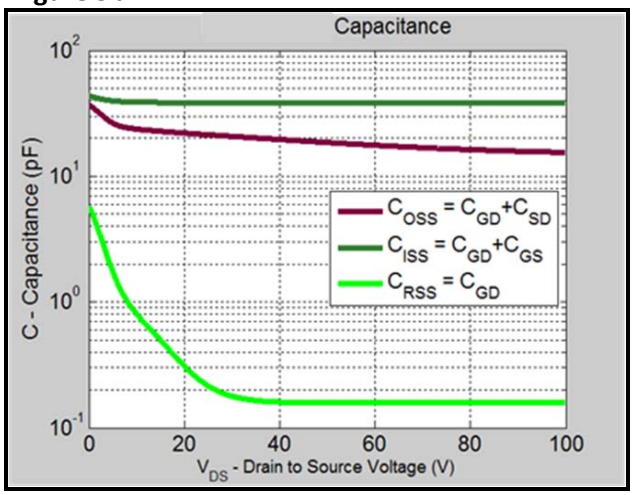


Figure 5a:



Linear Scale

Figure 5b:



Log Scale

Figure 6:

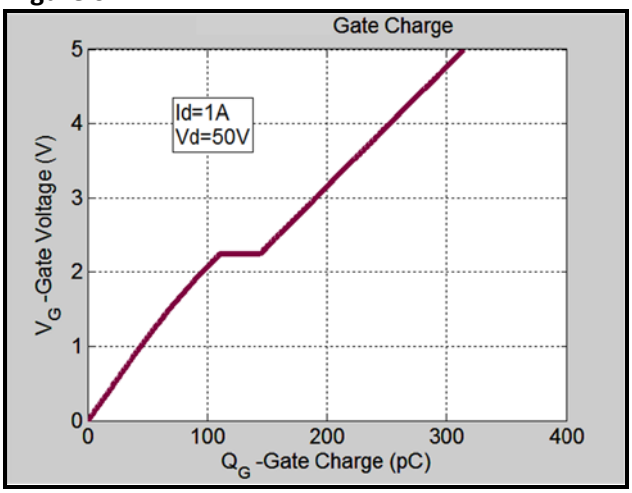
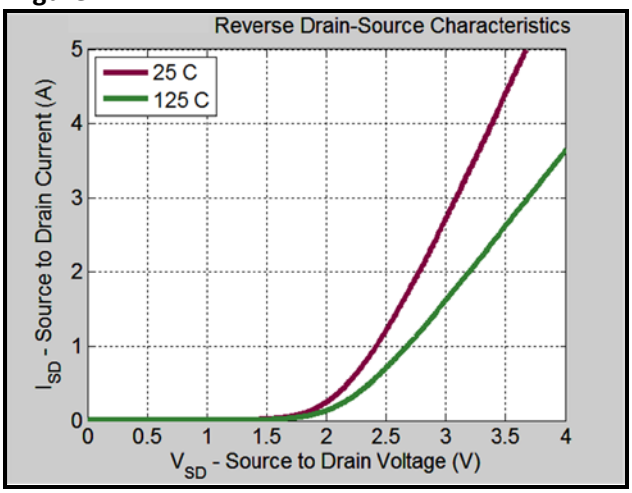


Figure 7:



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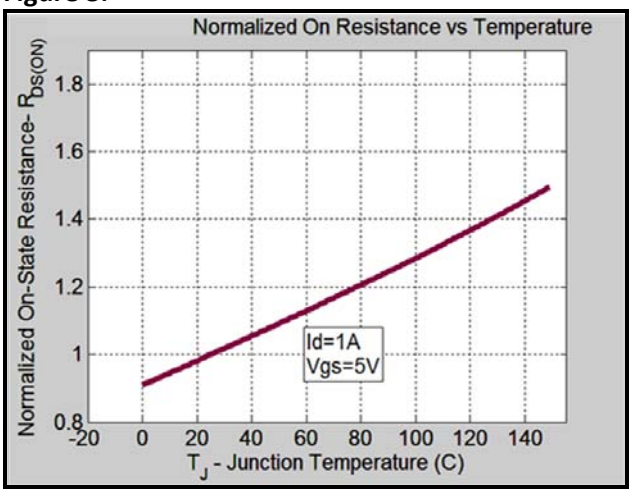
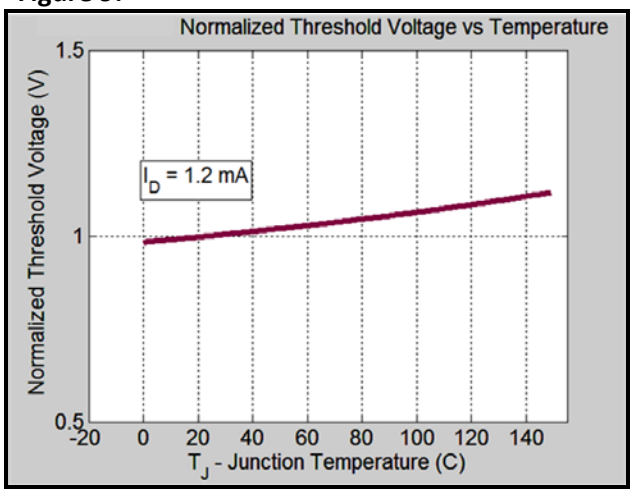


Figure 9:



All measurements were done with substrate shorted to source

S-PARAMETER CHARACTERISTICS

V_{GSQ} = 1.65 V, V_{DSQ} = 50 V, I_{DQ} = 0.35 A

Pulsed measurement, Heat-Sink Installed, Z_0 = 50 Ω

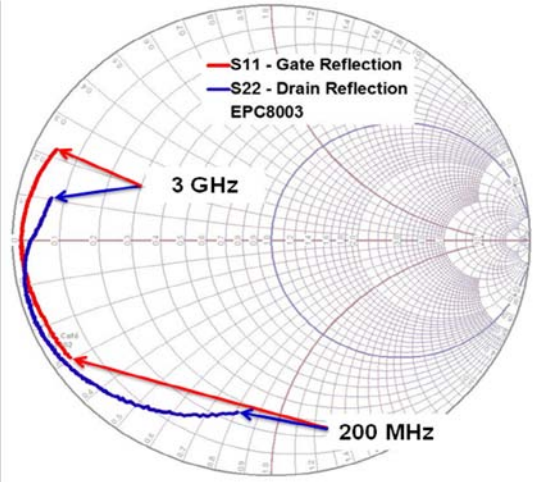


Figure 10: Smith Chart

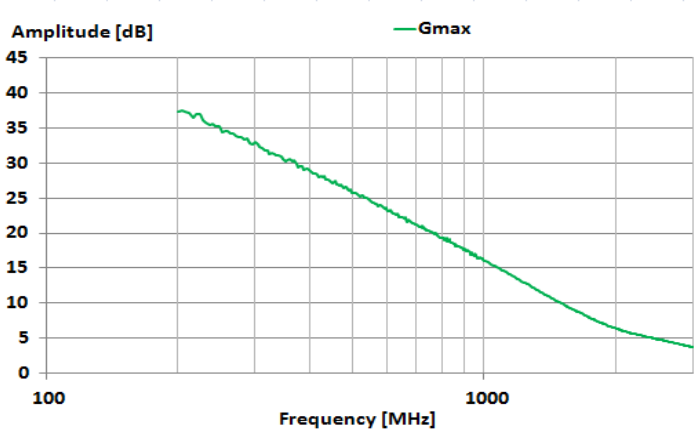


Figure 11: Gain Chart

Frequency [MHz]	Gate (Z_{GS}) [Ω]	Drain (Z_{DS}) [Ω]
200	2.20 – j14.48	12.63 – j40.14
500	1.02 – j5.15	1.71 – j16.51
1000	0.79 – j0.40	0.61 – j6.05
1200	0.85 + j0.79	0.80 – j4.20
1500	0.95 + j2.37	1.15 - j1.93
2000	1.21 + j5.01	2.14 + j0.68
2400	1.43 + j7.05	2.79 + j2.56
3000	2.21 + j11.18	3.52 + j5.39

Table 1: S-Parameter Table

Download S-parameter files at www.epc-co.com

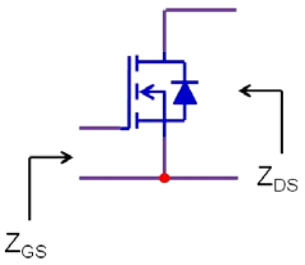


Figure 12: Device Reflection

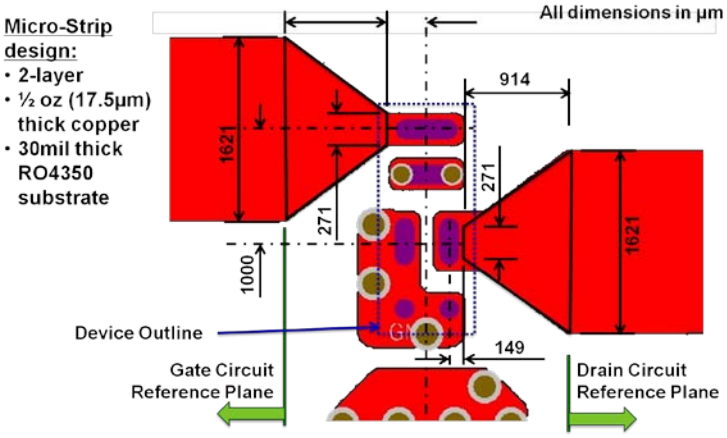
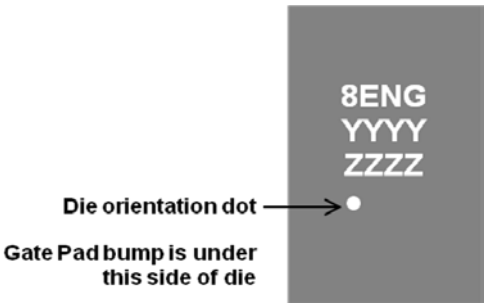


Figure 13: Taper and Reference Plane details – Device Connection

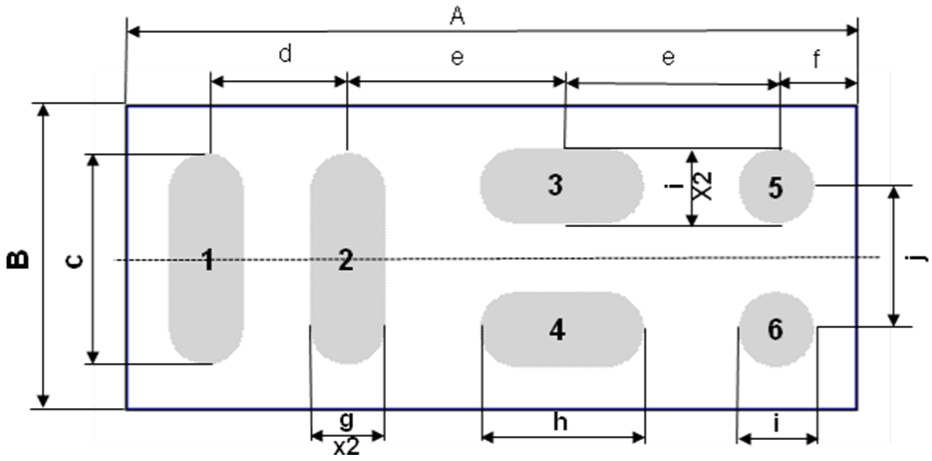
DIE MARKINGS



Part Number	Laser Marking		
	Part # Marking Line 1	Lot_Date Code Marking Line 2	Lot_Date Code Marking Line 3
EPC8003	8ENG	YYYY	ZZZZ

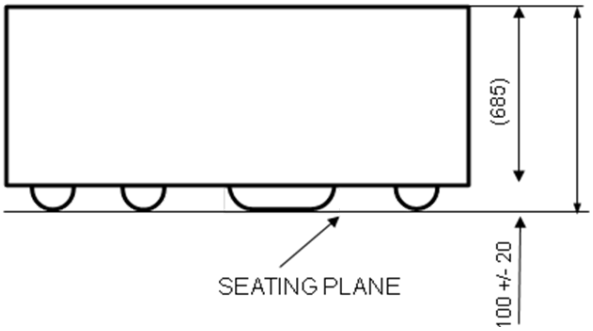
DIE OUTLINE

Solder Bar View



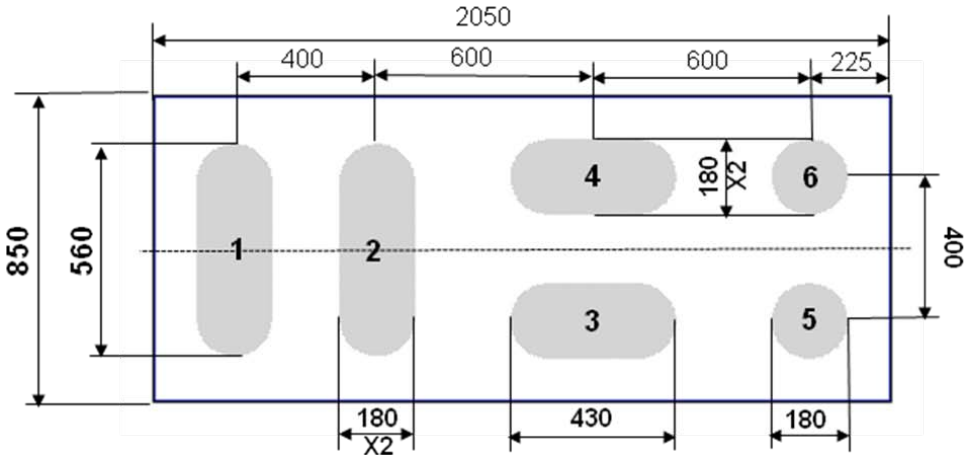
DIM	MICROMETERS		
	MIN	Nominal	MAX
A	2020	2050	2080
B	820	850	880
c	555	580	605
d	400	400	400
e	600	600	600
f	200	225	250
g	175	200	225
h	425	450	475
i	175	200	225
j	400	400	400

Side View



RECOMMENDED LAND PATTERN

(*units in µm)*



Pad no. 1 is Gate

Pad no. 2 is Source Return for Gate Driver

Pad no. 3 and 5 are Source

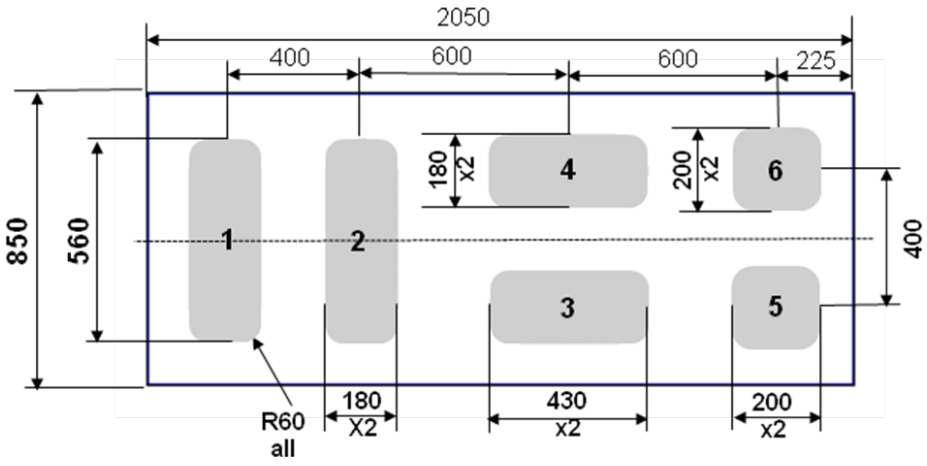
Pad no. 4 is Drain

Pad no. 6 is Substrate

Land pattern is solder mask defined
Solder mask opening is 10 µm smaller per side than bump

RECOMMENDED STENCIL

(*units in µm)*



Pad no. 1 is Gate

Pad no. 2 is Source Return for Gate Driver

Pad no. 3 and 5 are Source

Pad no. 4 is Drain

Pad no. 6 is Substrate

Recommended stencil should be 4mil (100µm) thick, must be laser cut, openings per drawing.
Note that openings for pads 5 & 6 are larger than solder mask opening.

Revised September, 2013