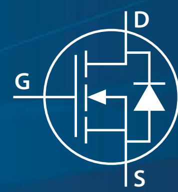
EPC2035 – Enhancement Mode Power Transistor

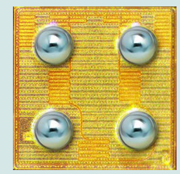
V_{DS} , 60 V
$R_{DS(on)}$, 45 mΩ
I_D , 1.7 A



EFFICIENT POWER CONVERSION

RoHS Halogen-Free

Gallium Nitride is grown on Silicon Wafers and processed using standard CMOS equipment leveraging the infrastructure that has been developed over the last 55 years. GaN's exceptionally high electron mobility and low temperature coefficient allows very low $R_{DS(on)}$, while its lateral device structure and majority carrier diode provide exceptionally low Q_G and zero Q_{RR}. The end result is a device that can handle tasks where very high switching frequency, and low on-time are beneficial as well as those where on-state losses dominate.



EPC2035 eGaN® FETs are supplied only in passivated die form with solder bumps
Die Size: 0.9 mm x 0.9 mm

Applications
- High Speed DC-DC conversion
- Wireless Power Transfer
- High Frequency Hard-Switching and Soft-Switching Circuits
- LiDAR/Pulsed Power Applications

Benefits
- Ultra High Efficiency
- Ultra Low $R_{DS(on)}$
- Ultra Low Q_G
- Ultra Small Footprint

www.epc-co.com/epc/Products/eGaNFETs/EPC2035.aspx

Maximum Ratings

PARAMETER		VALUE	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	60	V
	Drain-to-Source Voltage (up to 10,000 5 ms pulses at 125°C)	72	
I_D	Continuous (T_A = 25˚C, $R_{θJA}$ = 546°C/W)	1.7	A
	Pulsed (25°C, T_{PULSE} = 300 µs)	24	
V_{GS}	Gate-to-Source Voltage	6	V
	Gate-to-Source Voltage	–4	
T_J	Operating Temperature	–40 to 150	°C
T_{STG}	Storage Temperature	–40 to 150	

Static Characteristics (T_J = 25˚C unless otherwise stated)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-to-Source Voltage	V_{GS} = 0 V, I_D = 300 µA	60			V
I_{DSS}	Drain-Source Leakage	V_{DS} = 48 V, V_{GS} = 0 V		20	250	µA
I_{GSS}	Gate-to-Source Forward Leakage	V_{GS} = 5 V		0.1	1	mA
	Gate-to-Source Reverse Leakage	V_{GS} = -4 V		20	250	µA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 0.8 mA	0.8	1.4	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	V_{GS} = 5 V, I_D = 1 A		35	45	mΩ
V_{SD}	Source-Drain Forward Voltage	I_S = 0.5 A, V_{GS} = 0 V		2		V

All measurements were done with substrate shorted to source.

Thermal Characteristics

PARAMETER		TYP	UNIT
$R_{θJC}$	Thermal Resistance, Junction-to-Case	6.5	°C/W
$R_{θJB}$	Thermal Resistance, Junction-to-Board	65	
$R_{θJA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	100	

Note 1: $R_{θJA}$ 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

Dynamic Characteristics (T_J = 25˚C unless otherwise stated)						
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
C_{ISS}	Input Capacitance			95	115	
C_{RSS}	Reverse Transfer Capacitance	V_{DS} = 30 V, V_{GS} = 0 V		2	3	pF
C_{OSS}	Output Capacitance			60	90	
R_G	Gate Resistance			0.5		Ω
Q_G	Total Gate Charge	V_{DS} = 30 V, V_{GS} = 5 V, I_D = 1A		880	1150	
Q_{GS}	Gate-to-Source Charge			250		
Q_{GD}	Gate-to-Drain Charge	V_{DS} = 30 V, I_D = 1 A		160	270	
$Q_{G(TH)}$	Gate Charge at Threshold			170		pC
Q_{OSS}	Output Charge	V_{DS} = 30 V, V_{GS} = 0 V		2600	3900	
Q_{RR}	Source-Drain Recovery Charge			0		

All measurements were done with substrate shorted to source.

Figure 1: Typical Output Characteristics 25°C

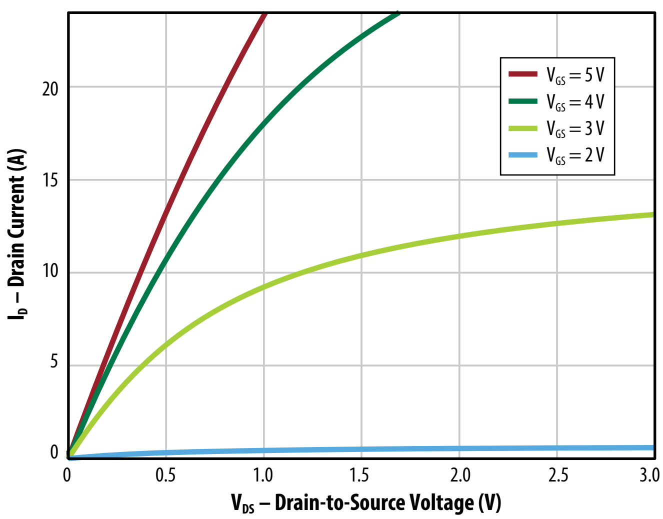


Figure 2: Transfer Characteristics

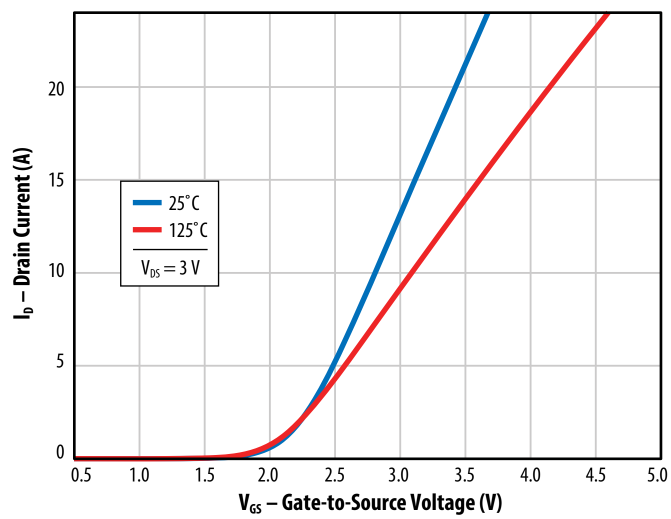


Figure 3: $R_{DS(on)}$ vs. V_{GS} for Various Drain Currents

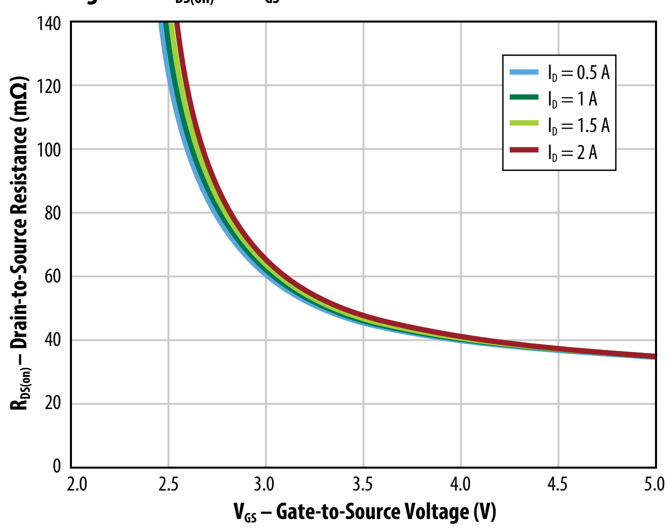


Figure 4: $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

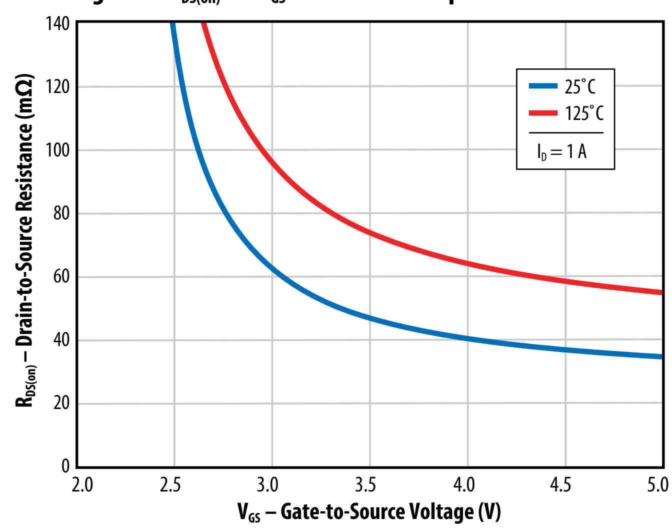


Figure 5a: Capacitance (Linear Scale)

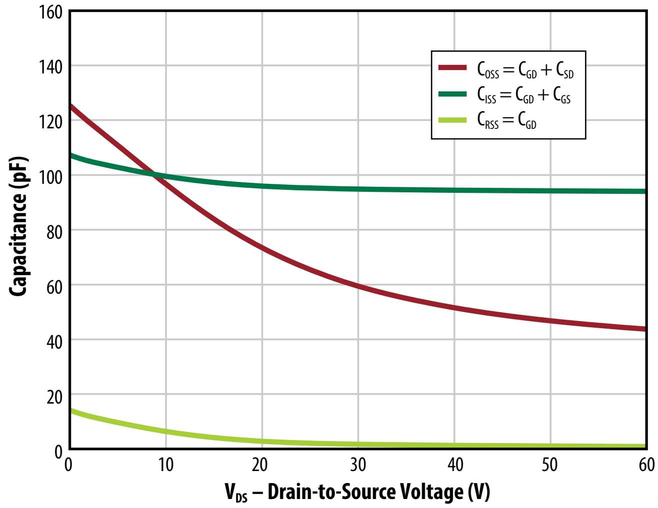


Figure 5b: Capacitance (Log Scale)

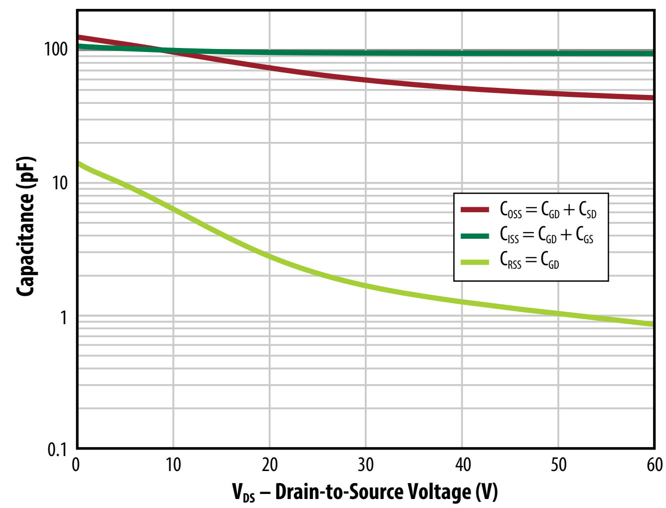


Figure 6: Gate Charge

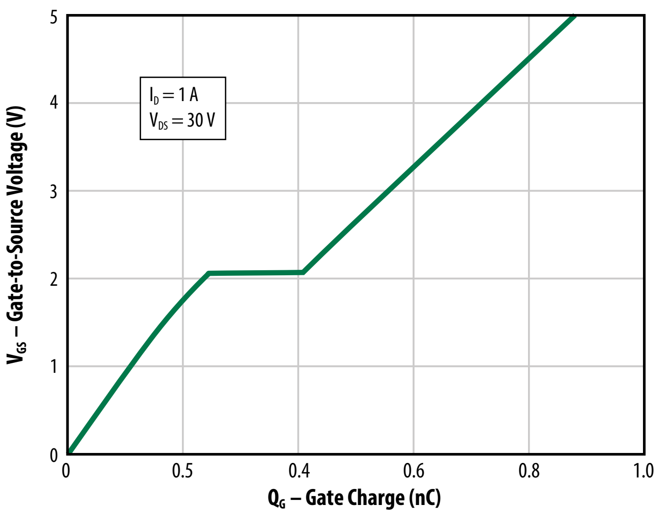


Figure 7: Reverse Drain-Source Characteristics

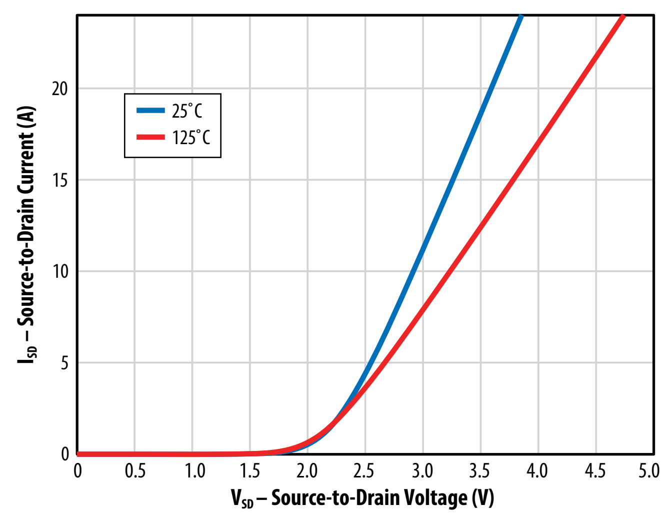


Figure 8: Normalized On Resistance vs. Temperature

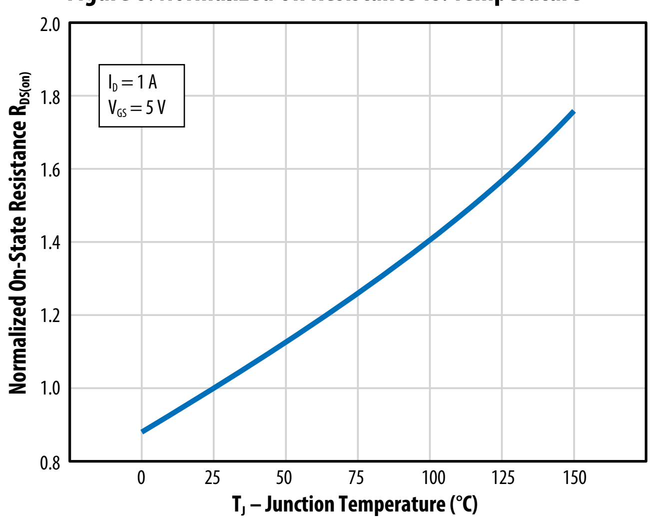
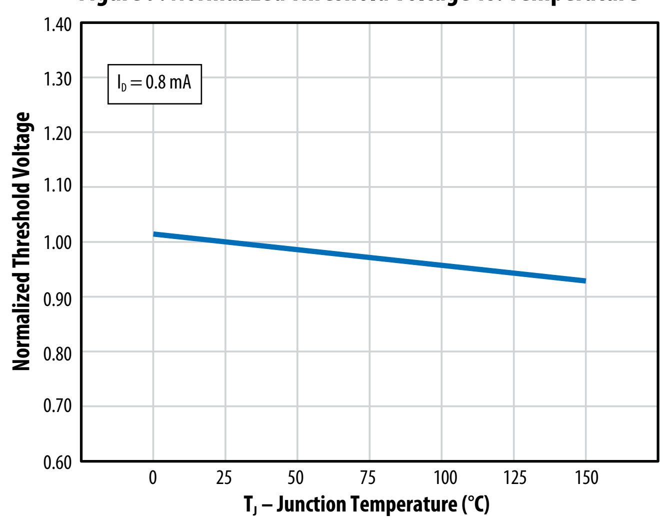


Figure 9: Normalized Threshold Voltage vs. Temperature



All measurements were done with substrate shortened to source.

Figure 10: Gate Leakage Current

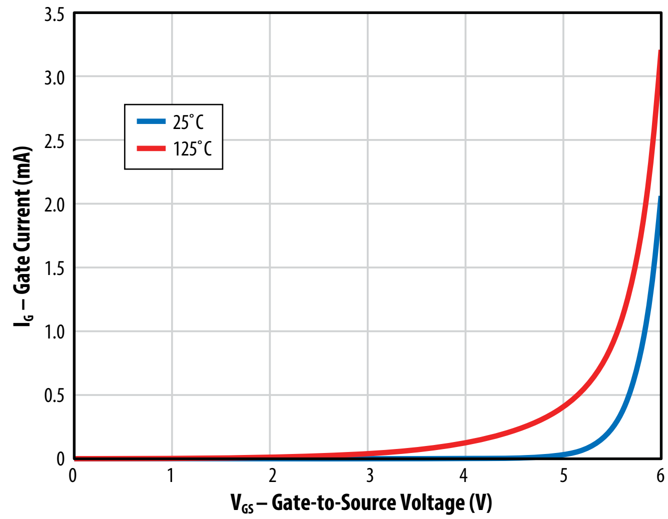
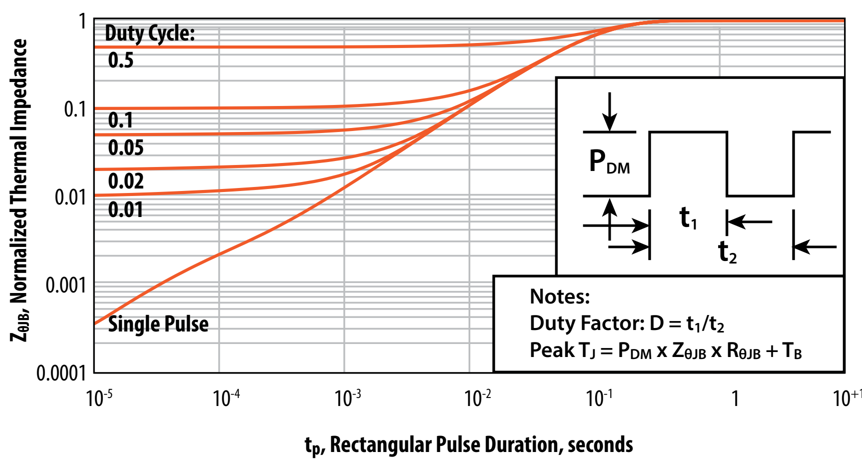


Figure 11: Transient Thermal Response Curves

Junction-to-Board



Junction-to-Case

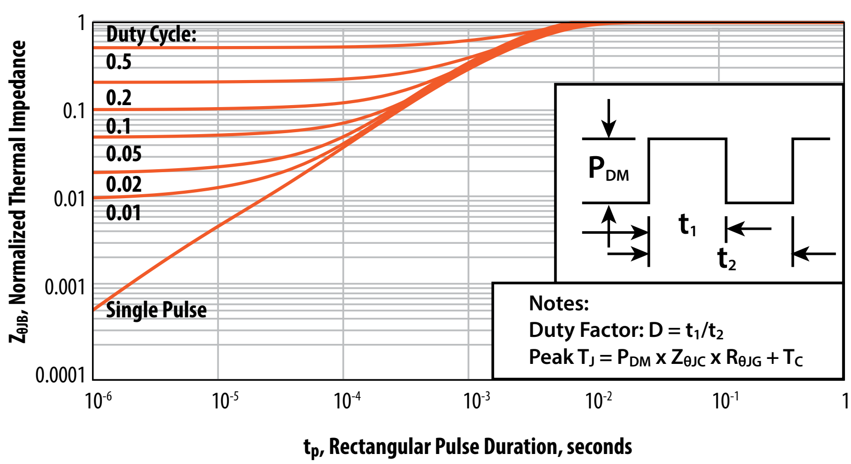
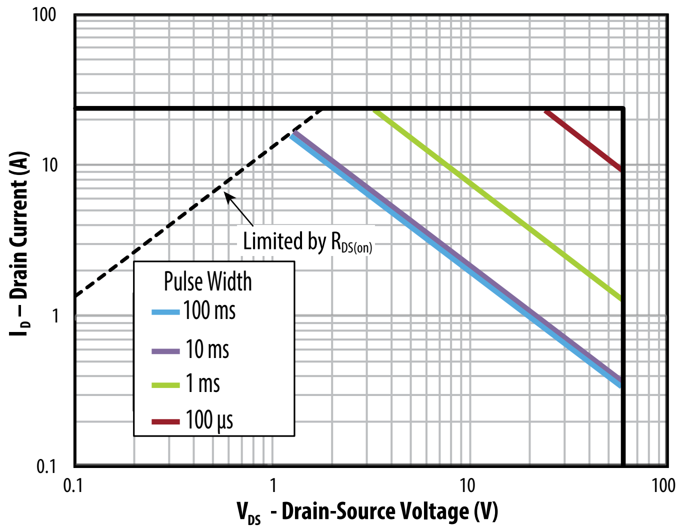
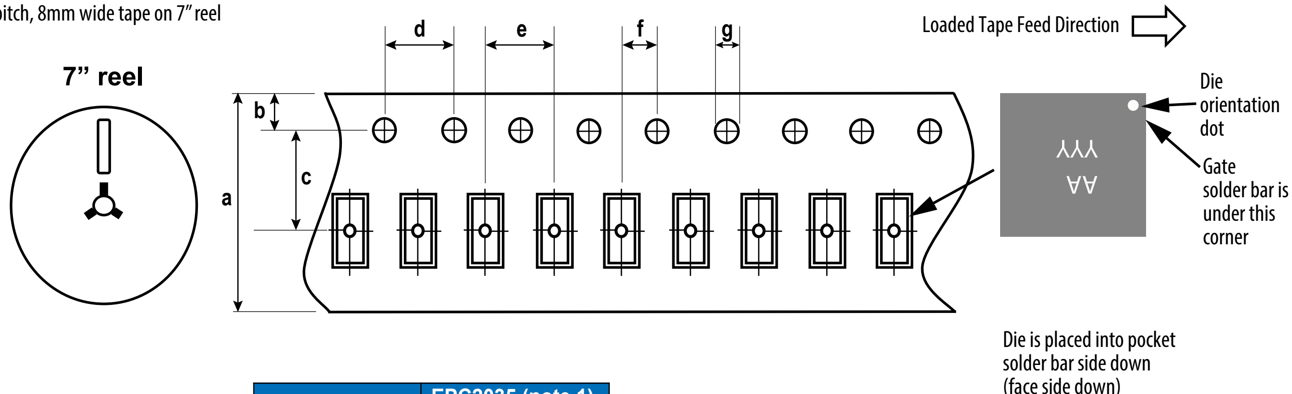


Figure 12: Safe Operating Area



TAPE AND REEL CONFIGURATION

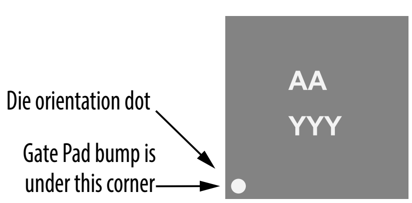
4mm pitch, 8mm wide tape on 7" reel



	EPC2035 (note 1)		
Dimension (mm)	target	min	max
a	8.00	7.90	8.30
b	1.75	1.65	1.85
c (see note)	3.50	3.45	3.55
d	4.00	3.90	4.10
e	4.00	3.90	4.10
f (see note)	2.00	1.95	2.05
g	1.5	1.5	1.6

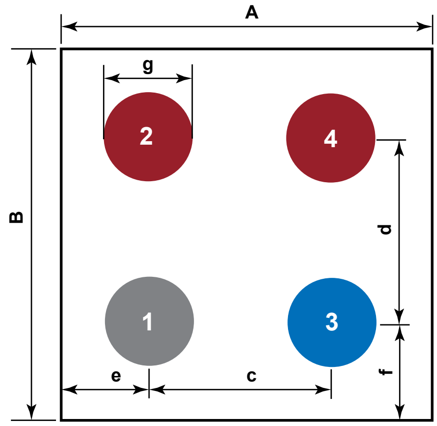
Note 1: MSL 1 (moisture sensitivity level 1) classified according to IPC/JEDEC industry standard.
Note 2: Pocket position is relative to the sprocket hole measured as true position of the pocket, not the pocket hole.

DIE MARKINGS



Part Number	Laser Markings	
	Part # Marking Line 1	Lot_Date Code Marking line 2
EPC2035	AA	YYY

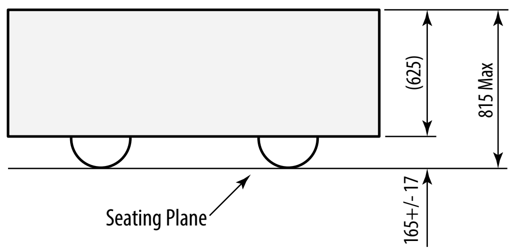
DIE OUTLINE
Solder Bump View



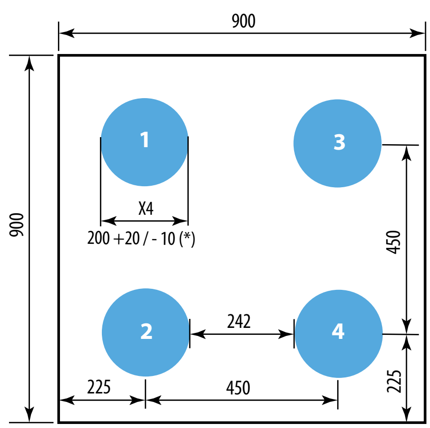
Pads 1 is Gate;
Pad 3 is Drain;
Pads 2, 4 are Source

DIM	Micrometers		
	MIN	Nominal	MAX
A	870	900	930
B	870	900	930
c	450	450	450
d	450	450	450
e	210	225	240
f	210	225	240
g	187	208	229

Side View



RECOMMENDED LAND PATTERN
(measurements in µm)



* minimum 190

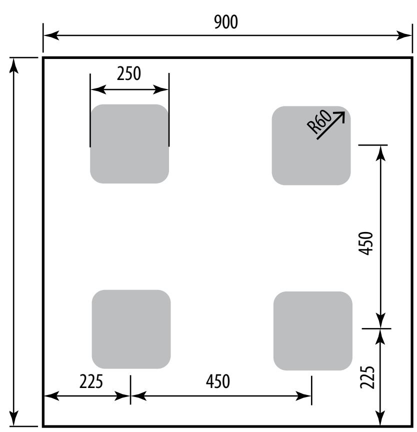
The land pattern is solder mask defined
Solder mask is 10 µm smaller per side than bump

Pads 1 is Gate;

Pad 3 is Drain;

Pads 2, 4 are Source

RECOMMENDED STENCIL DRAWING
(measurements in µm)



Recommended stencil should be 4mil (100 µm) thick, must be laser cut, openings per drawing.

Intended for use with SAC305 Type 4 solder, reference 88.5% metals content.

Additional assembly resources available at
http://epc-co.com/epc/DesignSupport/AssemblyBasics.aspx