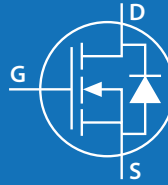


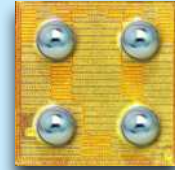
EPC2036 – Enhancement Mode Power Transistor

 V_{DS} , 100 V $R_{DS(on)}$, 73 mΩ I_D , 1.7 A

Revised February 7, 2022

Gallium Nitride'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.

Questions:
Ask a GaN
Expert



Die size: 0.9 x 0.9 mm

EPC2036 eGaN® FETs are supplied only in passivated die form with solder bumps.

Applications

- High speed DC-DC conversion
- Wireless power transfer
- High frequency hard-switching and soft-switching circuits
- Lidar/pulsed power applications
- Class-D audio

Benefits

- Ultra high efficiency
- Ultra low $R_{DS(on)}$
- Ultra low Q_G
- Ultra small footprint

Maximum Ratings			
PARAMETER		VALUE	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	100	V
	Drain-to-Source Voltage (up to 10,000 5 ms pulses at 150°C)	120	
I_D	Continuous ($T_A = 25^\circ\text{C}$, $R_{\theta JA} = 340^\circ\text{C/W}$)	1.7	A
	Pulsed (25°C, $T_{PULSE} = 300 \mu\text{s}$)	18	
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	

Thermal Characteristics			
PARAMETER		TYP	UNIT
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	6	°C/W
$R_{\theta JB}$	Thermal Resistance, Junction-to-Board	49	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	100	

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 https://epc-co.com/epc/documents/product-training/Appnote_Thermal_Performance_of_eGaN_FETs.pdf for details

Static Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise stated)						
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-to-Source Voltage	$V_{GS} = 0 \text{ V}$, $I_D = 300 \mu\text{A}$	100			V
I_{DSS}	Drain-Source Leakage	$V_{GS} = 0 \text{ V}$, $V_{DS} = 80 \text{ V}$		20	250	μA
I_{GSS}	Gate-to-Source Forward Leakage	$V_{GS} = 5 \text{ V}$		0.1	0.9	mA
	Gate-to-Source Reverse Leakage	$V_{GS} = -4 \text{ V}$		20	250	μA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 0.6 \text{ mA}$	0.8	1.4	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS} = 5 \text{ V}$, $I_D = 1 \text{ A}$		62	73	mΩ
V_{SD}	Source-Drain Forward Voltage [#]	$V_{GS} = 0 \text{ V}$, $I_S = 0.5 \text{ A}$		1.9		V

[#] Defined by design. Not subject to production test.

All measurements were done with substrate connected to source.

Scan QR code or click link below for more information including reliability reports, device models, demo boards!



<https://l.ead.me/EPC2036>

Dynamic Characteristics[#] ($T_J = 25^\circ\text{C}$ unless otherwise stated)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
C_{ISS}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}$		75	90	pF
C_{RSS}	Reverse Transfer Capacitance			0.7	1.1	
C_{OSS}	Output Capacitance			50	75	
R_G	Gate Resistance			0.6		Ω
Q_G	Total Gate Charge	$V_{GS} = 5\text{ V}, V_{DS} = 50\text{ V}, I_D = 1\text{ A}$		700	910	pC
Q_{GS}	Gate-to-Source Charge	$V_{DS} = 50\text{ V}, I_D = 1\text{ A}$		170		
Q_{GD}	Gate-to-Drain Charge			140	240	
$Q_{G(TH)}$	Gate Charge at Threshold			120		
Q_{OSS}	Output Charge	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}$		3900	5900	
Q_{RR}	Source-Drain Recovery Charge			0		

[#] Defined by design. Not subject to production test.

All measurements were done with substrate connected to source.

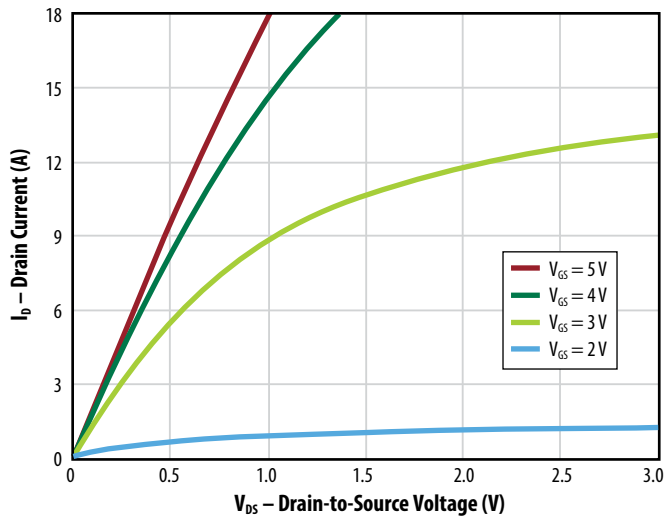
Figure 1: Typical Output Characteristics at 25°C 

Figure 2: Typical Transfer Characteristics

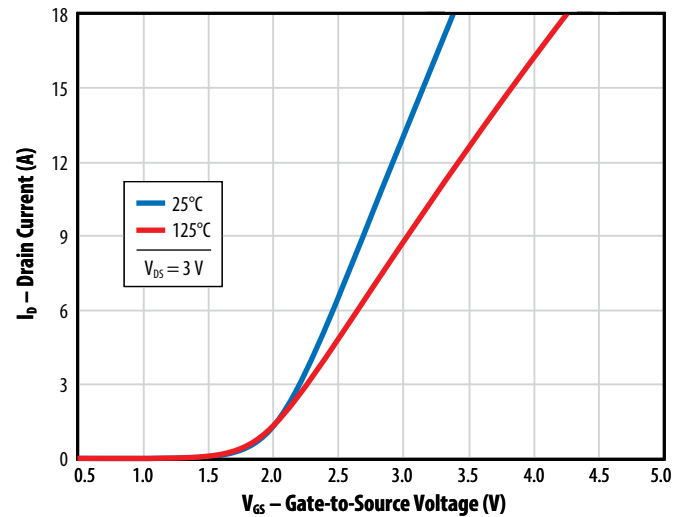
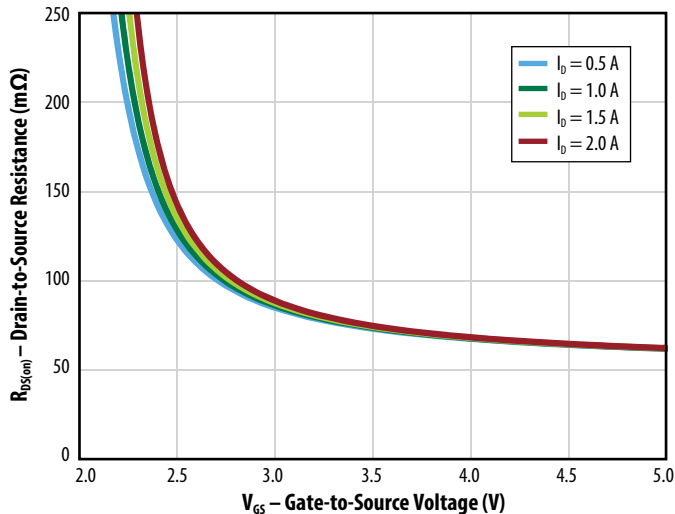
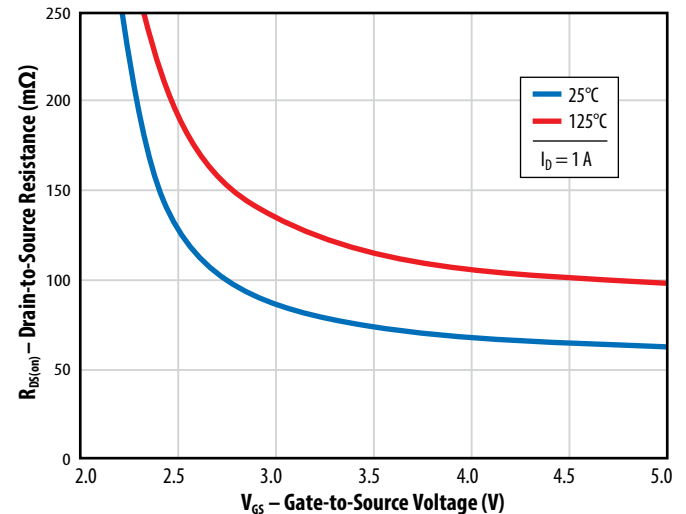
Figure 3: Typical $R_{DS(on)}$ vs. V_{GS} for Various Drain CurrentsFigure 4: Typical $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

Figure 5a: Typical Capacitance (Linear Scale)

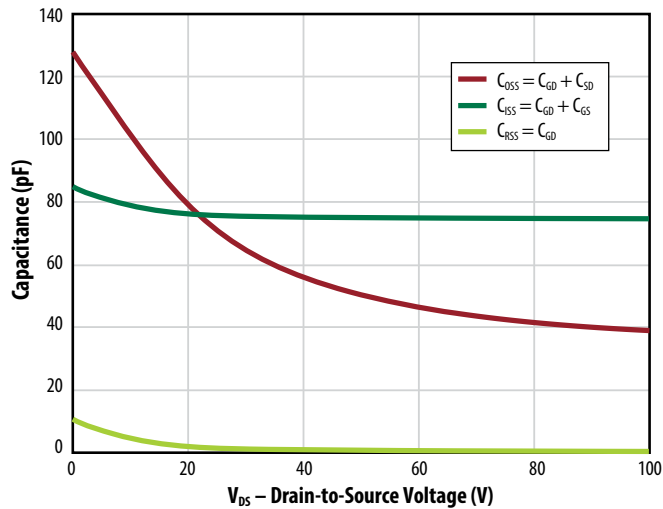


Figure 5b: Typical Capacitance (Log Scale)

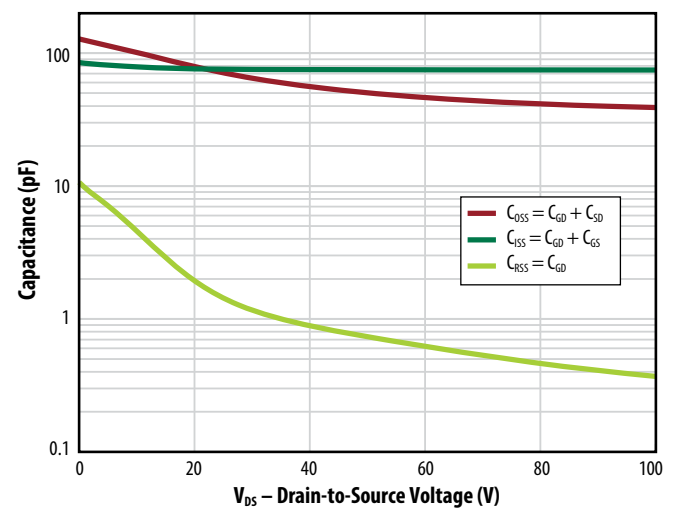


Figure 6: Typical Gate Charge

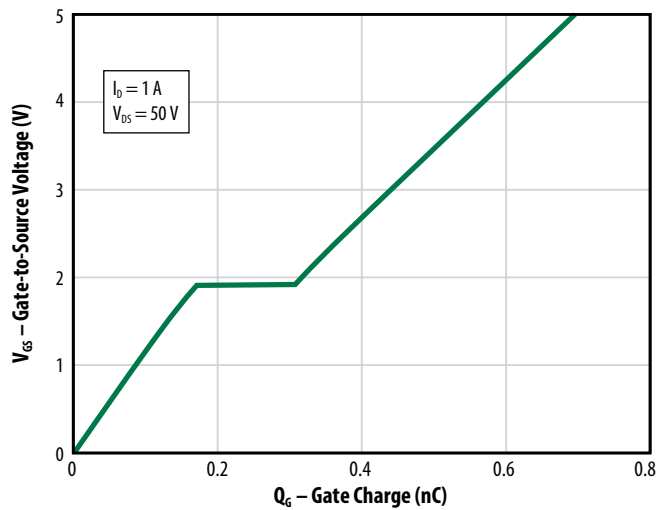
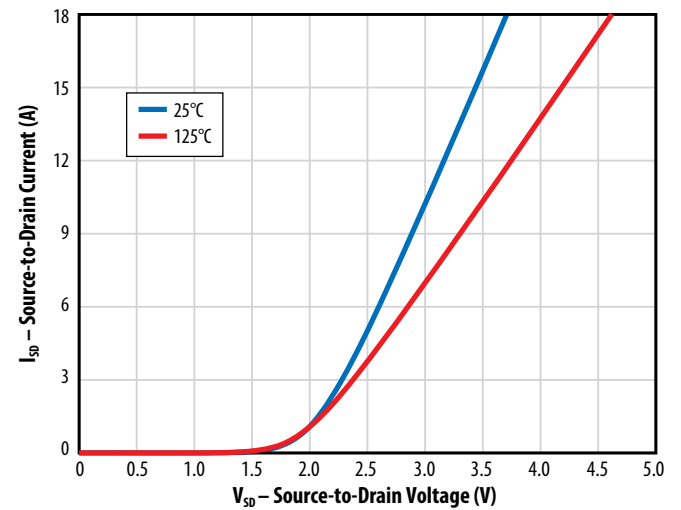


Figure 7: Typical Reverse Drain-Source Characteristics



Note: Negative gate drive voltage increases the reverse drain-source voltage. EPC recommends 0 V for OFF.

Figure 8: Typical Normalized On Resistance vs. Temperature

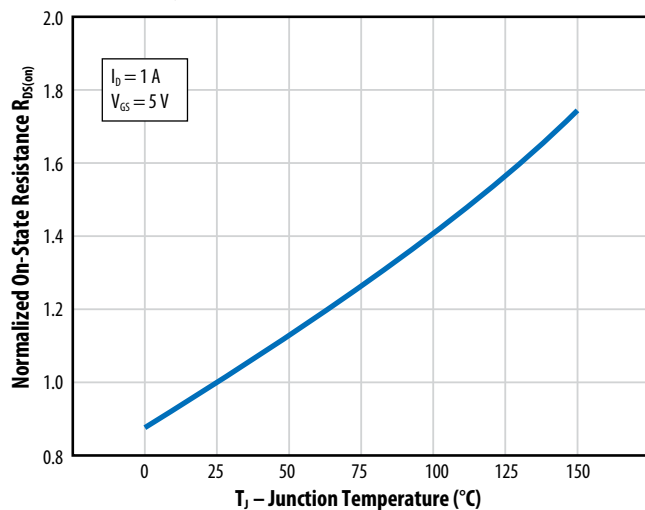


Figure 9: Typical Normalized Threshold Voltage vs. Temp.

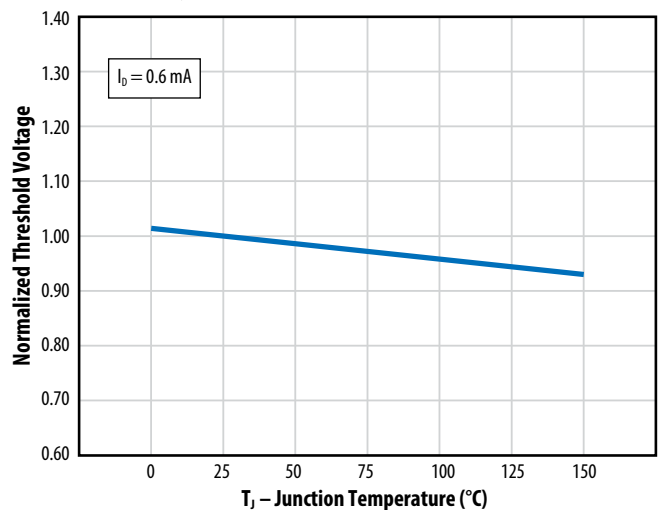


Figure 10: Typical Gate Leakage Current

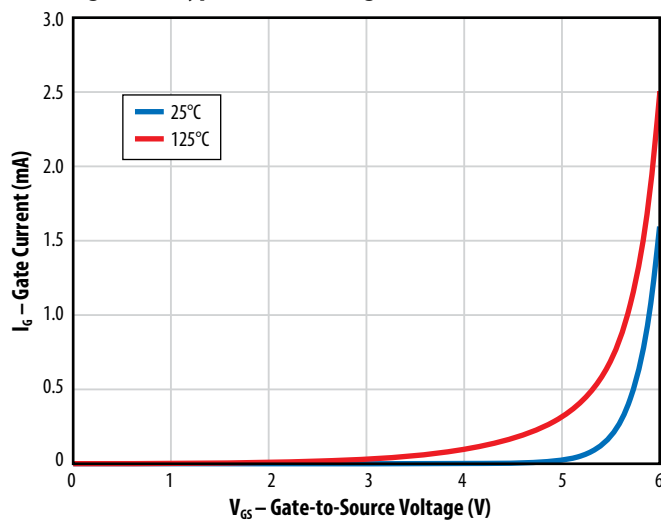


Figure 11: Typical Transient Thermal Response Curves

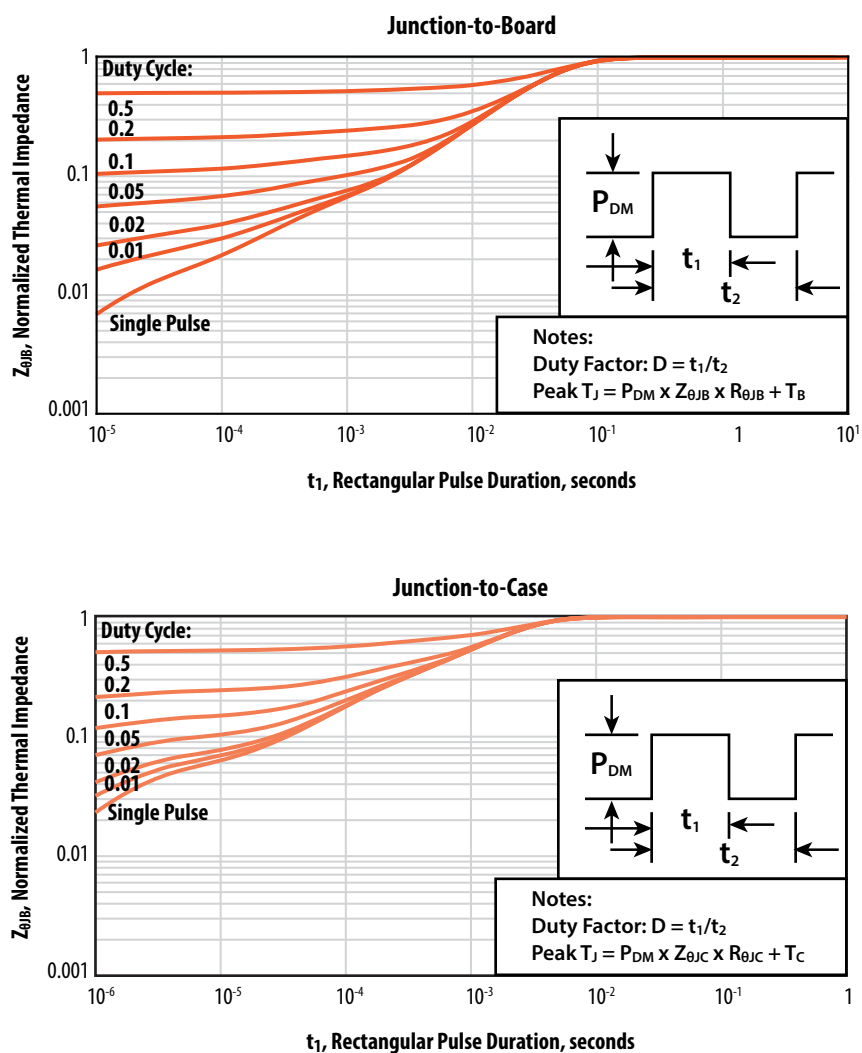
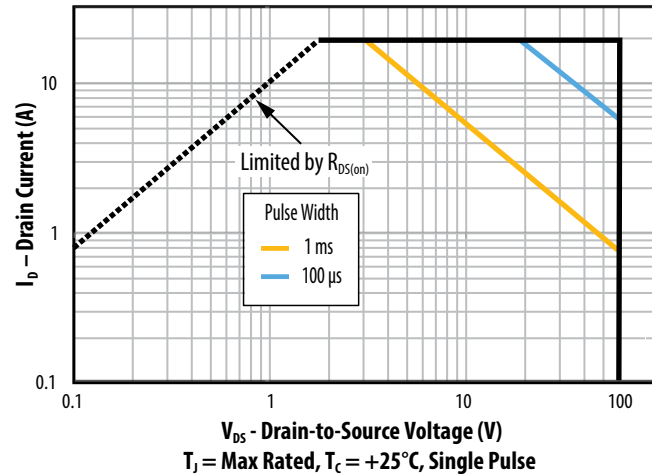
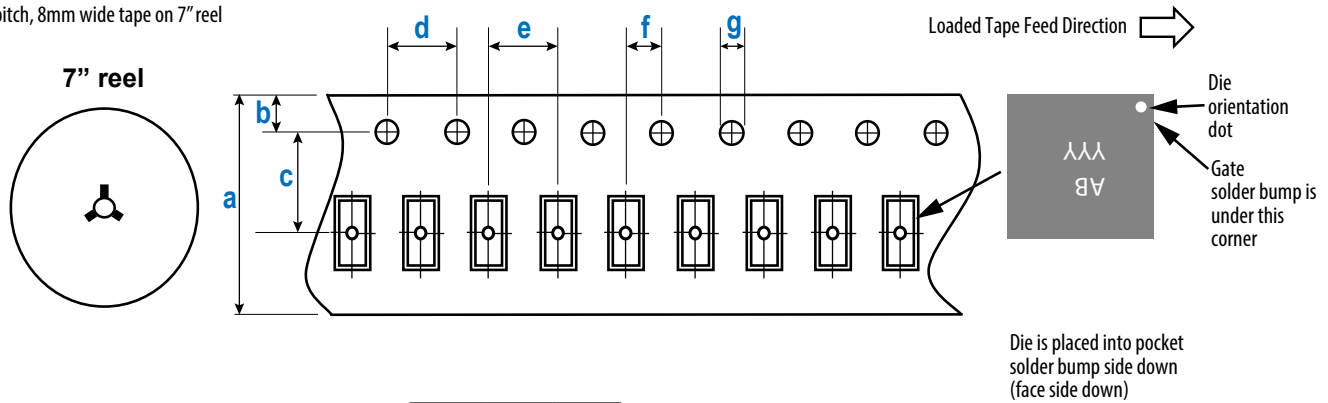


Figure 12: Safe Operating Area



TAPE AND REEL CONFIGURATION

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

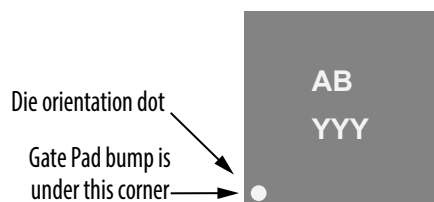


EPC2036 (Note 1)	Dimension (mm)		
	Target	MIN	MAX
a	8.00	7.90	8.30
b	1.75	1.65	1.85
c (Note 2)	3.50	3.45	3.55
d	4.00	3.90	4.10
e	4.00	3.90	4.10
f (Note 2)	2.00	1.95	2.05
g	1.50	1.50	1.60

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.

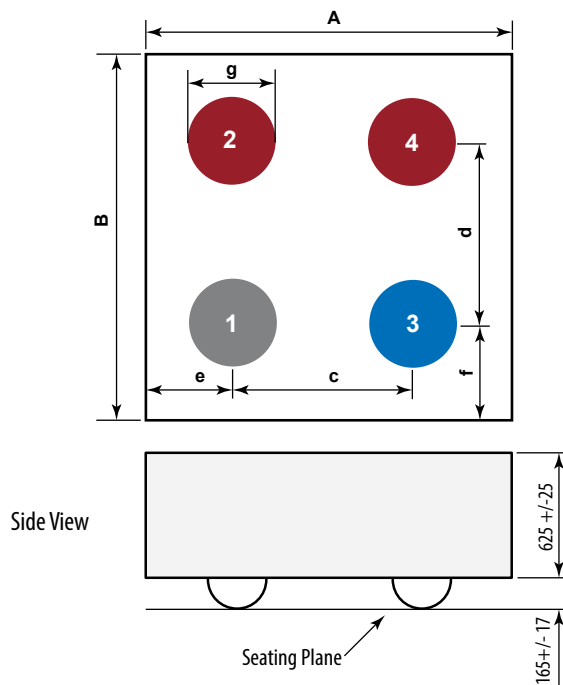
DIE MARKINGS



Part Number	Laser Markings	
	Part # Marking Line 1	Lot_Date Code Marking Line 2
EPC2036	AB	YYY

DIE OUTLINE

Solder Bump View

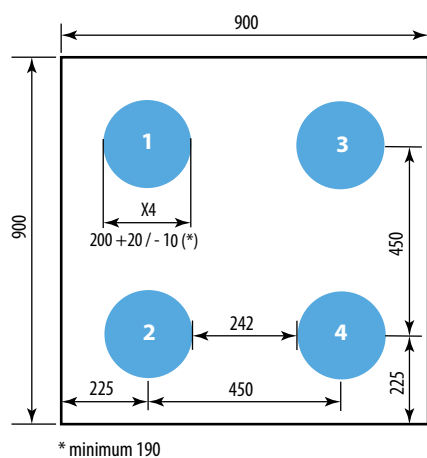


DIM	MIN	Nominal	MAX
A	870	900	930
B	870	900	930
c	450	450	450
d	450	450	450
e	210	225	240
f	210	225	240
g	187	208	229

Pad 1 is Gate;

Pad 3 is Drain;

Pads 2, 4 are Source

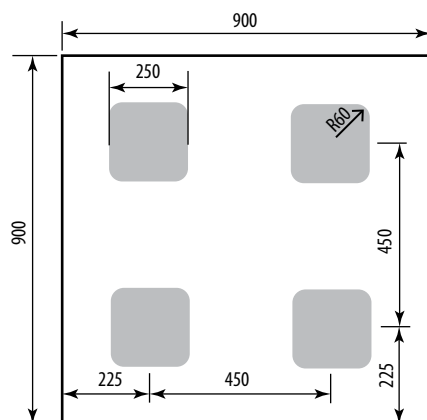
**RECOMMENDED
LAND PATTERN**(measurements in μm)

The land pattern is solder mask defined.

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
<https://epc-co.com/epc/design-support>

Efficient Power Conversion Corporation (EPC) reserves the right to make changes without further notice to any products herein to improve reliability, function or design. EPC does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others.

eGaN® is a registered trademark of Efficient Power Conversion Corporation.

EPC Patent Listing: <https://epc-co.com/epc/about-epc/patents>

Information subject to change without notice.