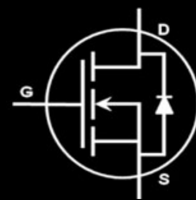
EPC2012 – Enhancement Mode Power Transistor

V_{DSS} , 200 V
$R_{DS(ON)}$, 100 mΩ
I_D , 3 A

NEW PRODUCT

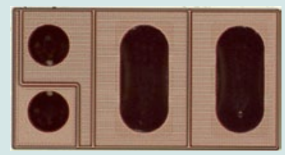


EFFICIENT POWER CONVERSION

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.

Maximum Ratings			
V_{DS}	Drain-to-Source Voltage	200	V
I_D	Continuous (T_A =25˚C, θ_{JA} = 70)	3	A
	Pulsed (25˚C, Tpulse = 300 µs)	15	
V_{GS}	Gate-to-Source Voltage	6	V
	Gate-to-Source Voltage	-5	
T_J	Operating Temperature	-40 to 125	˚C
T_{STG}	Storage Temperature	-40 to 150	



EPC2012 eGaN® FETs are supplied only in passivated die form with solder bars

Applications

- High Speed DC-DC conversion
- Class D Audio
- Hard Switched and High Frequency Circuits

Benefits

- Ultra High Efficiency
- Ultra Low $R_{DS(on)}$
- Ultra low Q_G
- Ultra small footprint

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics (T_J= 25˚C unless otherwise stated)						
BV_{DSS}	Drain-to-Source Voltage	V_{GS} = 0 V, I_D = 60 µA	200			V
I_{DSS}	Drain Source Leakage	V_{DS} = 160 V, V_{GS} = 0 V		10	50	µA
I_{GSS}	Gate-Source Forward Leakage	V_{GS} = 5 V		0.2	1	mA
	Gate-Source Reverse Leakage	V_{GS} = -5 V		0.1	0.5	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 1 mA	0.7	1.4	2.5	V
$R_{DS(ON)}$	Drain-Source On Resistance	V_{GS} = 5 V, I_D = 3 A		70	100	mΩ
Source-Drain Characteristics (T_J= 25˚C unless otherwise stated)						
V_{SD}	Source-Drain Forward Voltage	I_S = 0.5 A, V_{GS} = 0 V, T = 25˚C		1.9		V
		I_S = 0.5 A, V_{GS} = 0 V, T = 125˚C		2		

All measurements were done with substrate shorted to source.

Thermal Characteristics			
		TYP	
$R_{\theta JC}$	Thermal Resistance, Junction to Case	7.6	˚C/W
$R_{\theta JB}$	Thermal Resistance, Junction to Board	36	˚C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1)	85	˚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.

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Dynamic Characteristics (T_J= 25˚C unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V		128	145	pF
C_{OSS}	Output Capacitance			73	95	
C_{RSS}	Reverse Transfer Capacitance			3.3	4.4	
Q_G	Total Gate Charge (V_{GS} = 5 V)	V_{DS} = 100 V, I_D = 3 A		1.5	1.8	nC
Q_{GD}	Gate to Drain Charge			0.57	0.75	
Q_{GS}	Gate to Source Charge			0.33	0.41	
Q_{OSS}	Output Charge	V_{DS} = 100 V, V_{GS} = 0 V		11	14	
Q_{RR}	Source-Drain Recovery Charge			0		

All measurements were done with substrate shorted to source.

Figure 1: Typical Output Characteristics

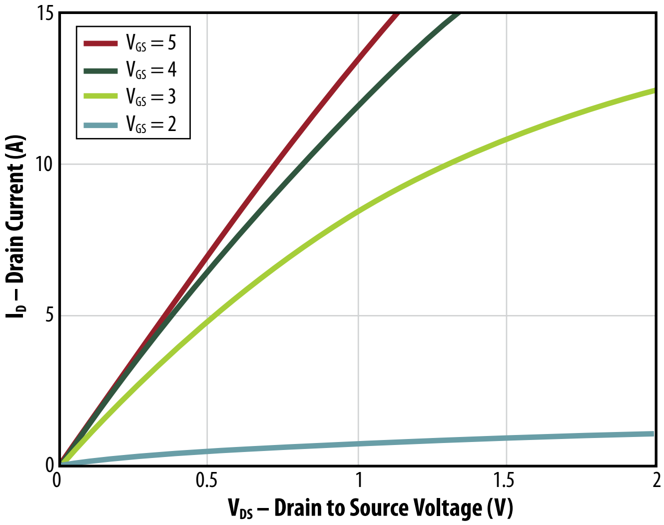


Figure 2: Transfer Characteristics

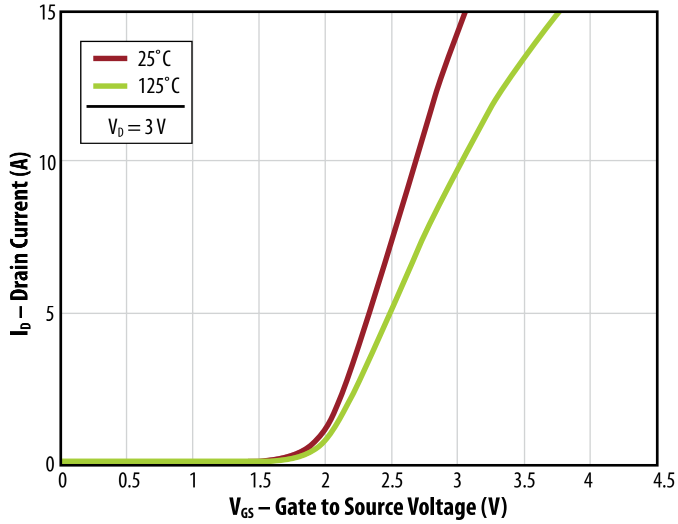


Figure 3: $R_{DS(ON)}$ vs. V_{GS} for Various Drain Currents

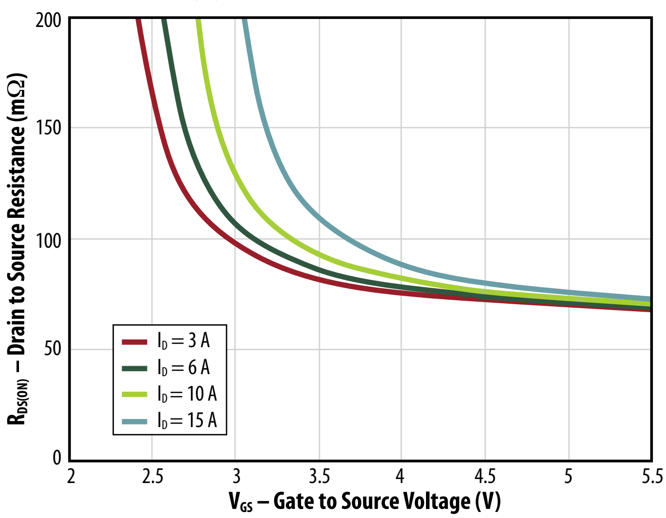


Figure 4: $R_{DS(ON)}$ vs. V_{GS} for Various Temperatures

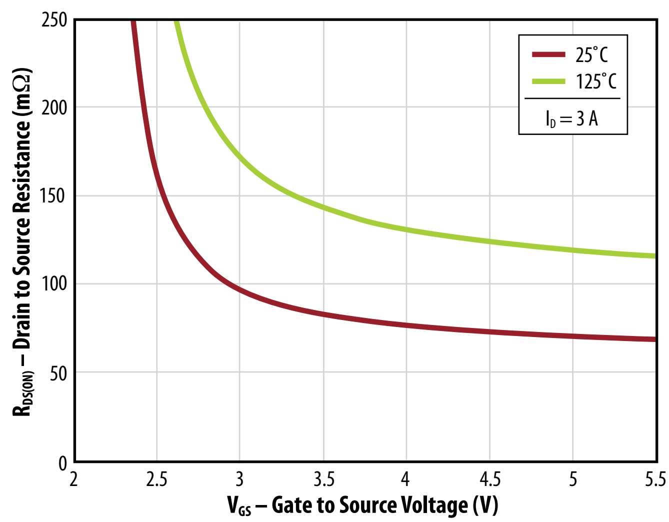


Figure 5: Capacitance

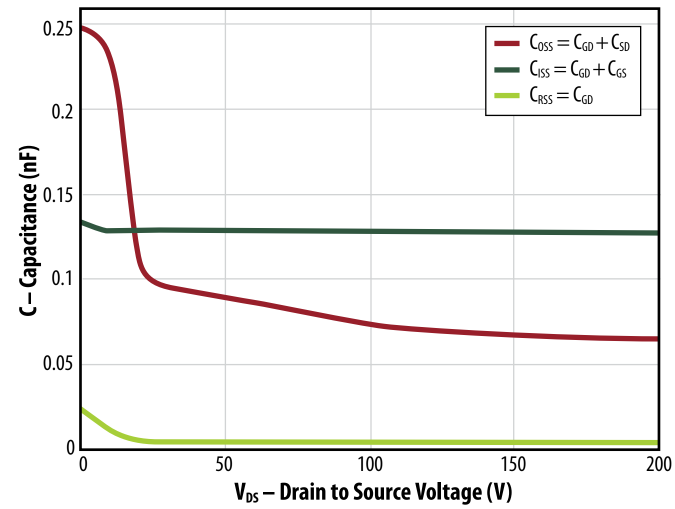


Figure 6: Gate Charge

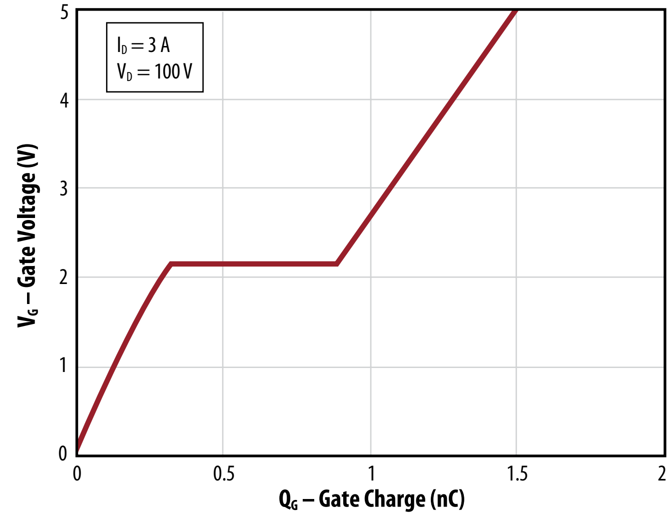


Figure 7: Reverse Drain-Source Characteristics

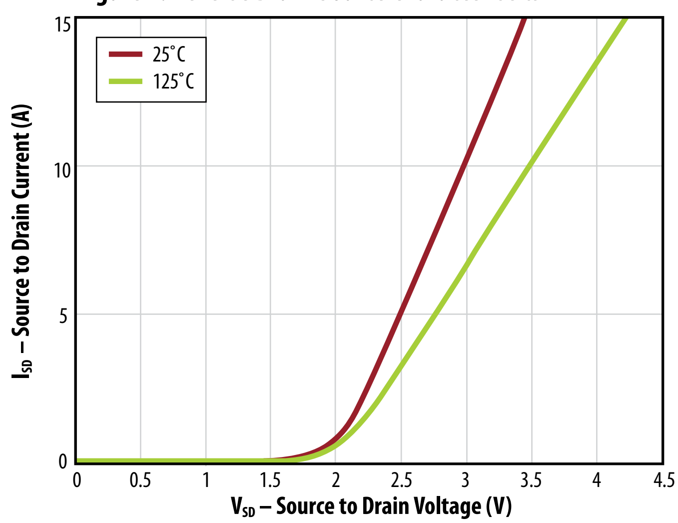


Figure 8: Normalized On Resistance vs. Temperature

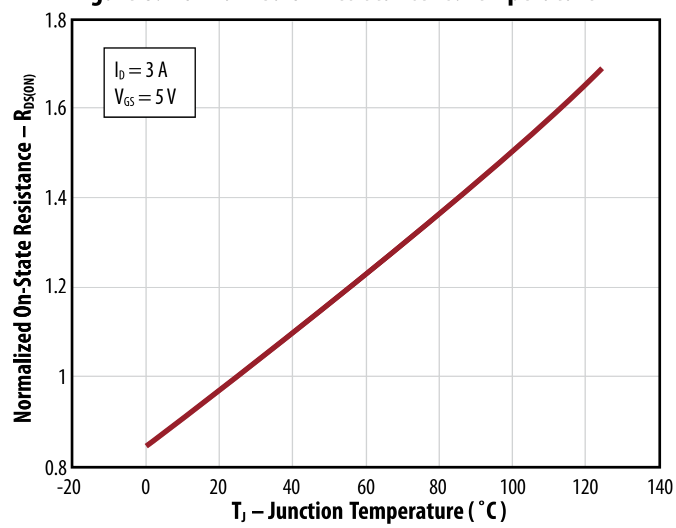


Figure 9: Normalized Threshold Voltage vs. Temperature

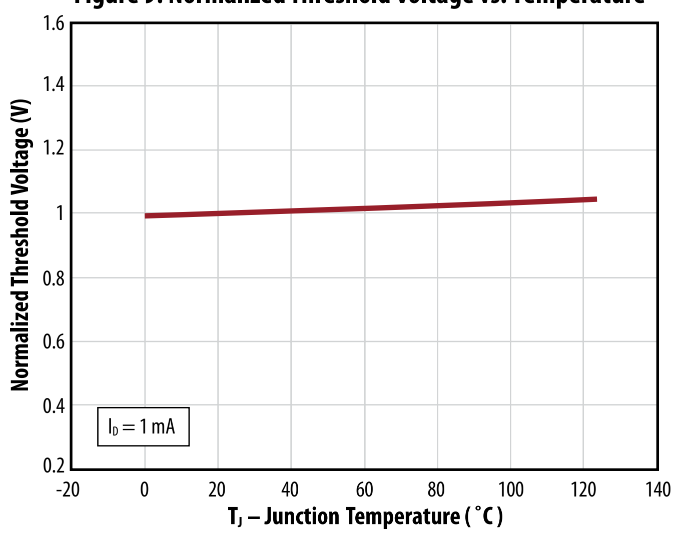
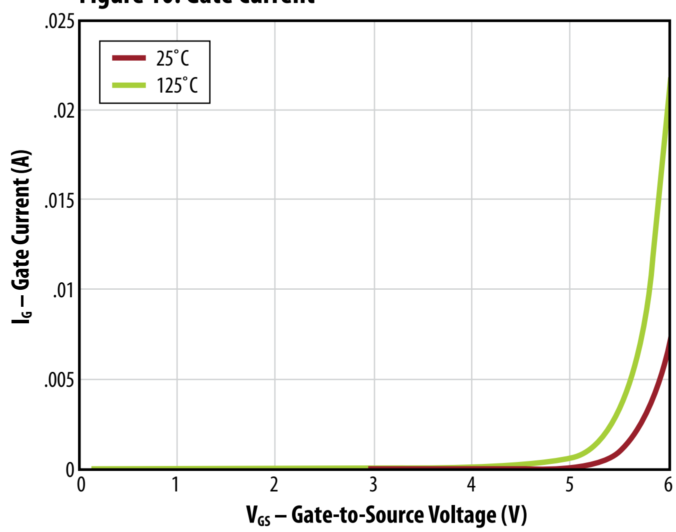
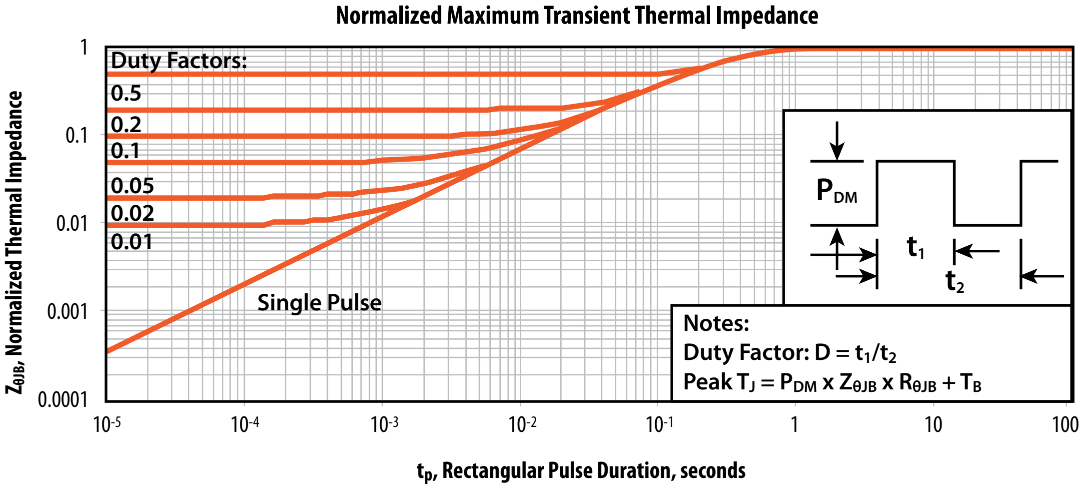


Figure 10: Gate Current



All measurements were done with substrate shortened to source.

Figure 11: Transient Thermal Response Curves



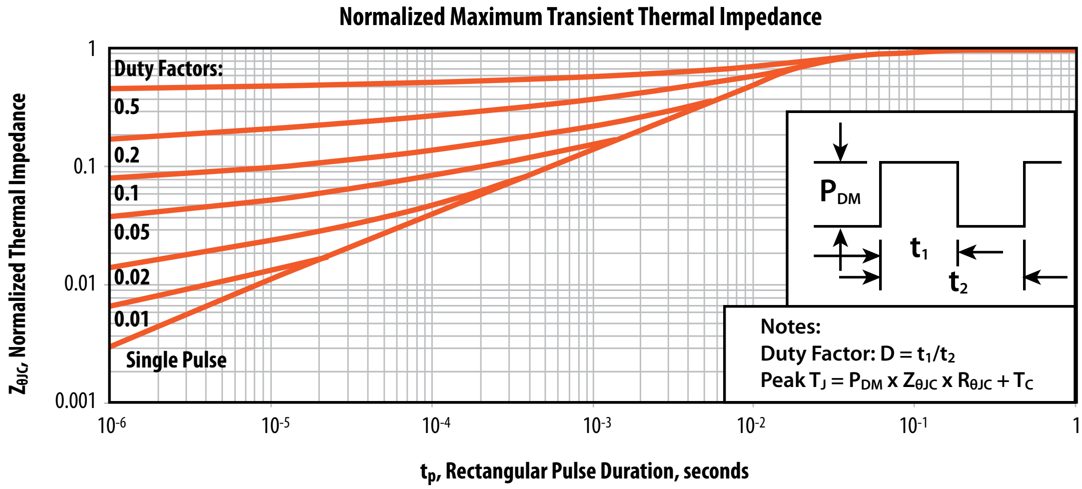
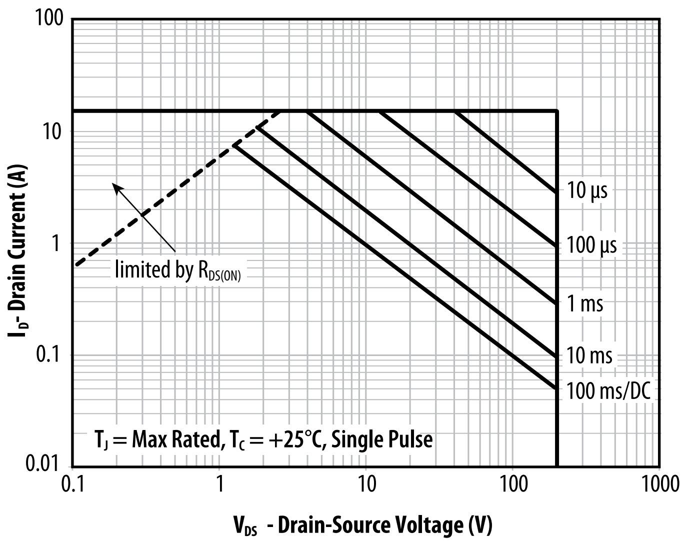
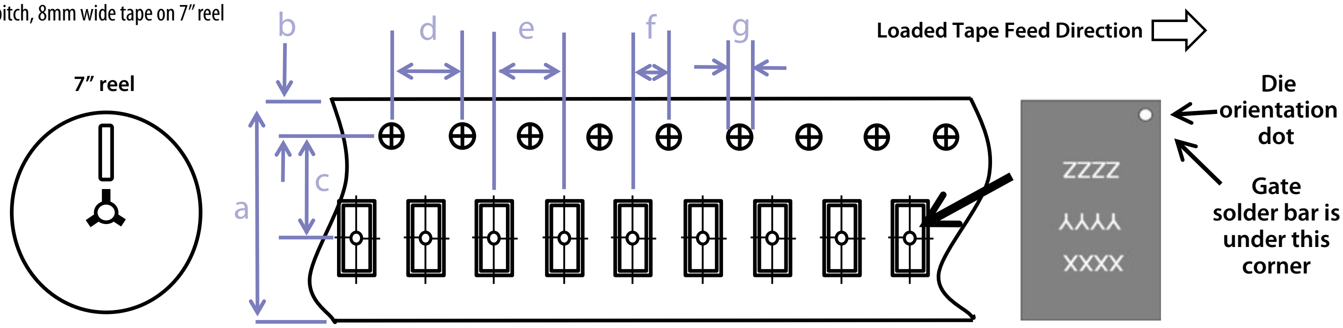


Figure 12: Safe Operating Area



TAPE AND REEL CONFIGURATION

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

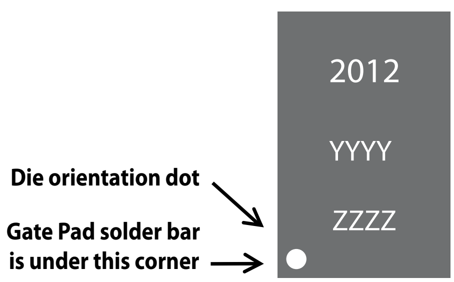


Die is placed into pocket solder bar side down (face side down)

	EPC2012 (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	1.5	1.5	1.6

Note 1: MSL1 (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.

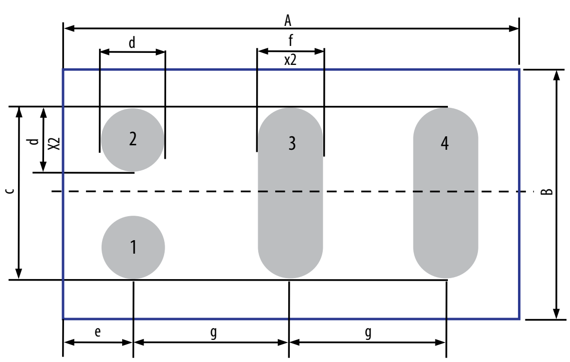
DIE MARKINGS



Part Number	Laser Markings		
	Part # Marking Line 1	Lot_Date Code Marking line 2	Lot_Date Code Marking Line 3
EPC2012	2012	YYYY	ZZZZ

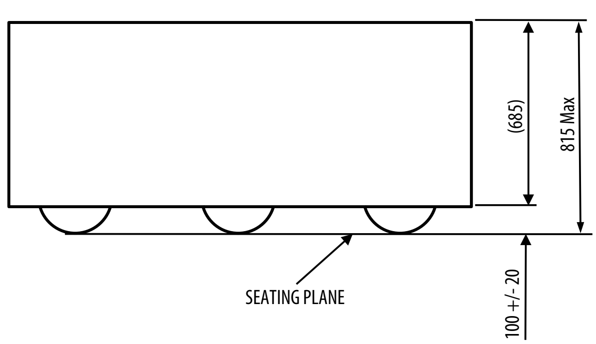
DIE OUTLINE

Solder Bar View



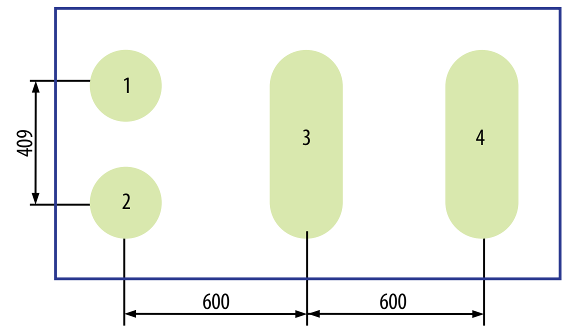
DIM	MILLIMETERS		
	MIN	Nominal	MAX
A	1.681	1.711	1.741
B	0.889	0.919	0.949
c	0.660	0.663	0.666
d	0.251	0.254	0.257
e	0.230	0.245	0.260
f	0.251	0.254	0.257
g	0.600	0.600	0.600

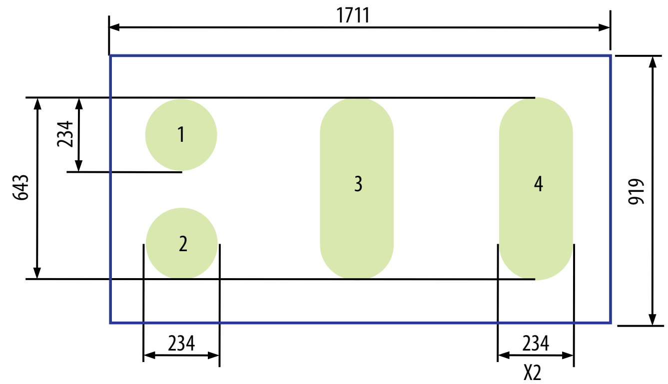
Side View



RECOMMENDED LAND PATTERN
(units in µm)

The land pattern is solder mask defined





Pad no. 1 is Gate

Pad no. 2 is Substrate

Pad no. 3 is Drain

Pad no. 4 is Source

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