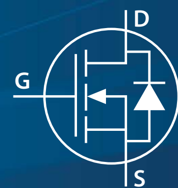
THE DATASHEET OF

EPC2012C

EPC2012C – Enhancement Mode Power Transistor

V_{DS} , 200 V
$R_{DS(on)}$, 100 mΩ
I_D , 5 A



EFFICIENT POWER CONVERSION

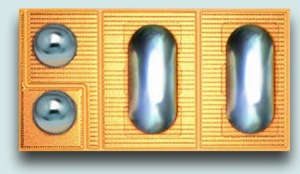
RoHS Halogen-Free

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.

Maximum Ratings			
PARAMETER		VALUE	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	200	V
I_D	Continuous (T_A = 25˚C, $R_{θJA}$ = 26°C/W)	5	A
	Pulsed (25°C, T_{PULSE} = 300 µs)	22	
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
$R_{θJC}$	Thermal Resistance, Junction-to-Case	4.2	°C/W
$R_{θJB}$	Thermal Resistance, Junction-to-Board	12.5	
$R_{θJA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	85	

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



EPC2012C eGaN® FETs are supplied only in passivated die form with solder bars

Applications

- High Frequency DC-DC Conversion
- Class D Audio
- Wireless Power Transfer

Benefits

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

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 = 60 µA	200			V
I_{DSS}	Drain-Source Leakage	V_{GS} = 0 V, V_{DS} = 160 V		10	50	µA
I_{GSS}	Gate-to-Source Forward Leakage	V_{GS} = 5 V		0.2	1	mA
	Gate-to-Source Reverse Leakage	V_{GS} = -4 V		10	50	µA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 1 mA	0.8	1.4	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	V_{GS} = 5 V, I_D = 3 A		70	100	mΩ
V_{SD}	Source-Drain Forward Voltage	I_S = 0.5 A, V_{GS} = 0 V		1.9		V

All measurements were done with substrate connected to source.

Dynamic Characteristics (T_J = 25°C unless otherwise stated)						
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
C_{ISS}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V		100	140	pF
C_{RSS}	Reverse Transfer Capacitance			0.4	0.6	
C_{OSS}	Output Capacitance			64	85	
R_G	Gate Resistance			0.6		Ω
Q_G	Total Gate Charge	V_{DS} = 100 V, V_{GS} = 5 V, I_D = 3 A		1	1.3	nC
Q_{GS}	Gate-to-Source Charge	V_{DS} = 100 V, I_D = 3 A		0.3		
Q_{GD}	Gate-to-Drain Charge			0.2	0.35	
$Q_{G(TH)}$	Gate Charge at Threshold			0.2		
Q_{OSS}	Output Charge	V_{DS} = 100 V, V_{GS} = 0 V		10	13	
Q_{RR}	Source-Drain Recovery Charge			0		

All measurements were done with substrate connected to source.
Note 2: $C_{OSS(ER)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 50% BV_{DSS}.
Note 3: $C_{OSS(TR)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 50% BV_{DSS}.

Figure 1: Typical Output Characteristics at 25°C

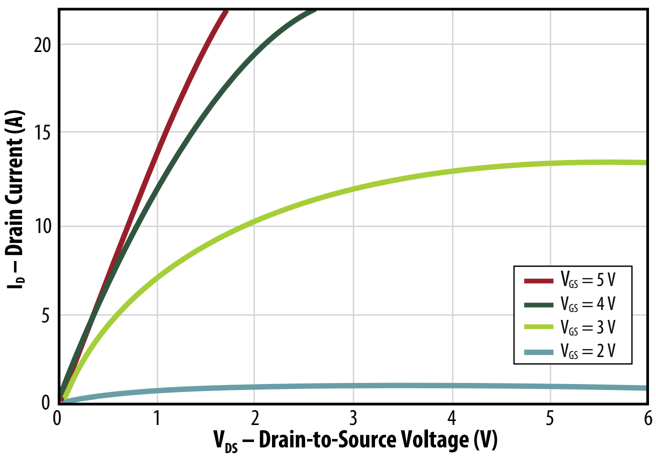


Figure 2: Transfer Characteristics

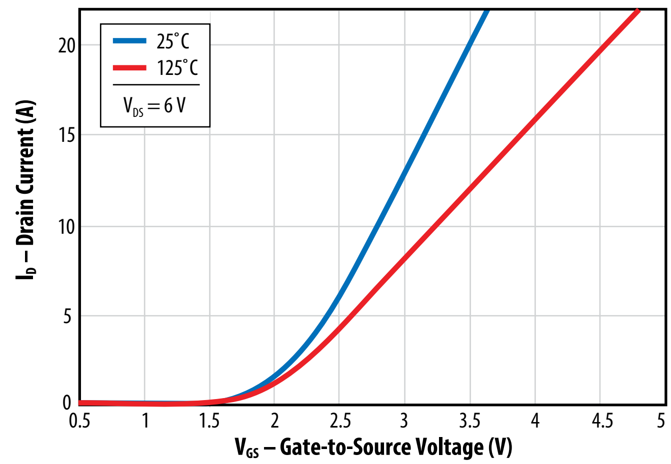


Figure 3: $R_{DS(on)}$ vs. V_{GS} for Various Drain Currents

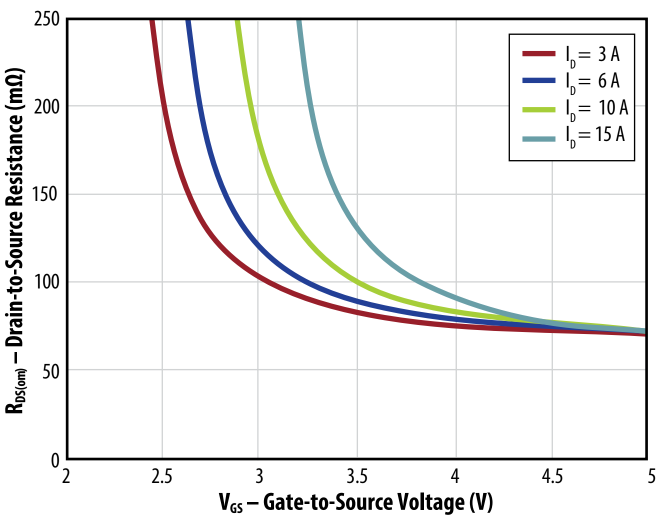


Figure 4: $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

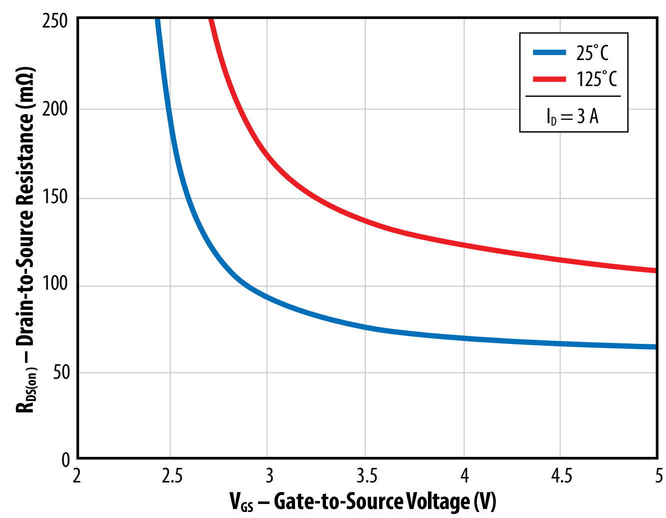


Figure 5a: Capacitance (Linear Scale)

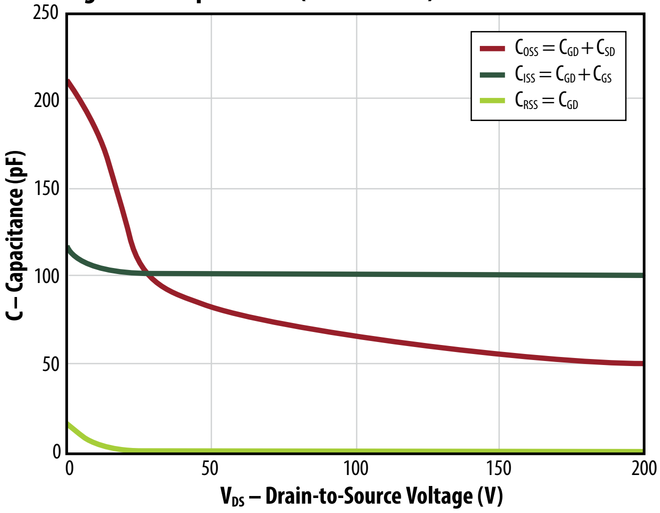


Figure 5b: Capacitance (Log Scale)

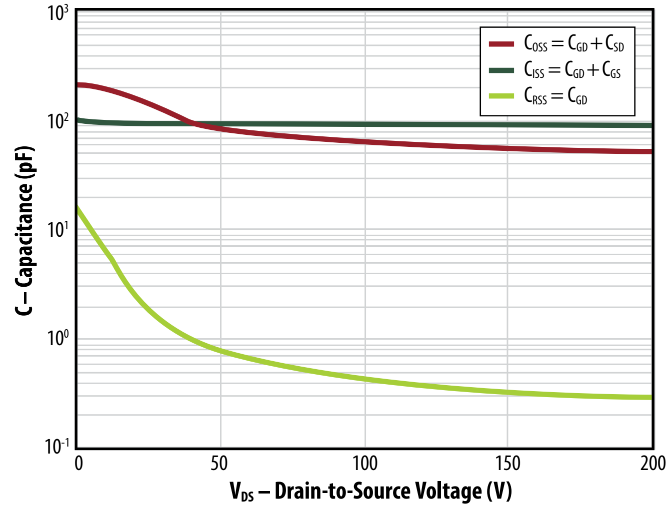


Figure 6: Gate Charge

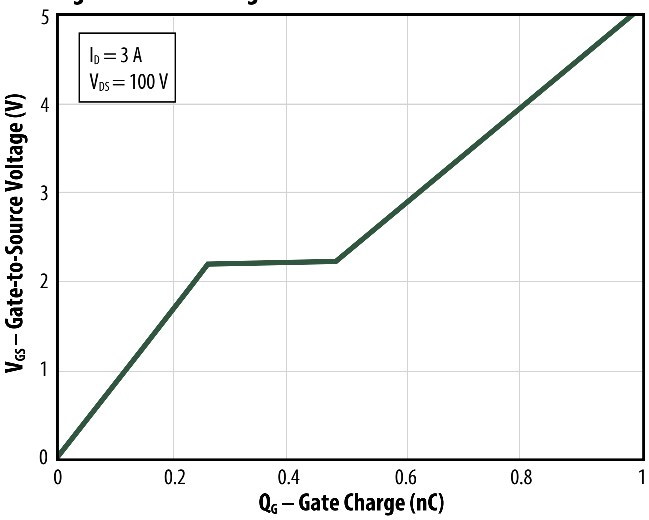


Figure 7: Reverse Drain-Source Characteristics

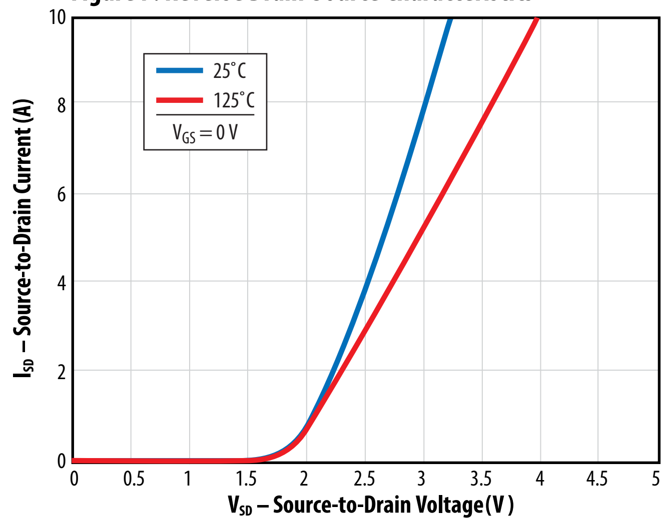


Figure 8: Normalized On Resistance vs. Temperature

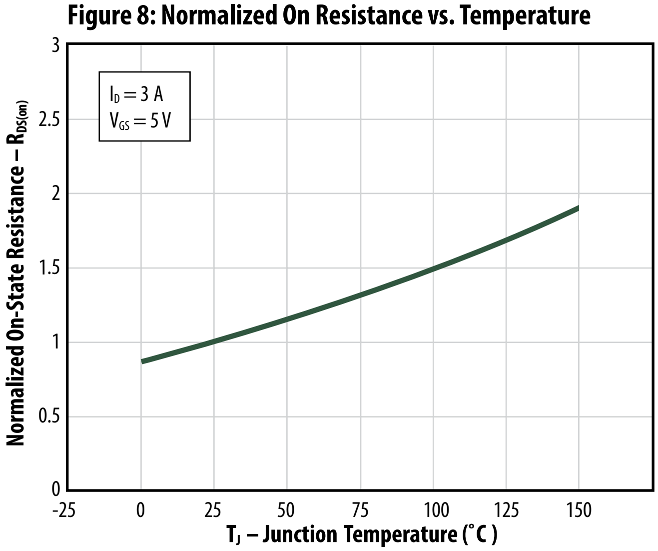
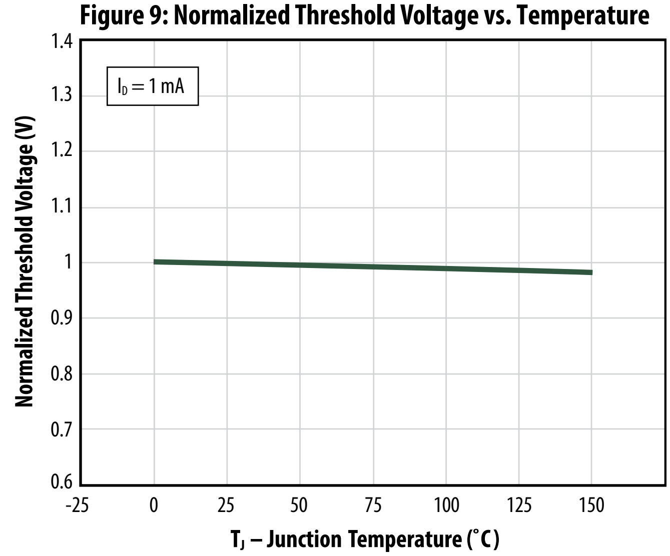


Figure 9: Normalized Threshold Voltage vs. Temperature



All measurements were done with substrate shortened to source.

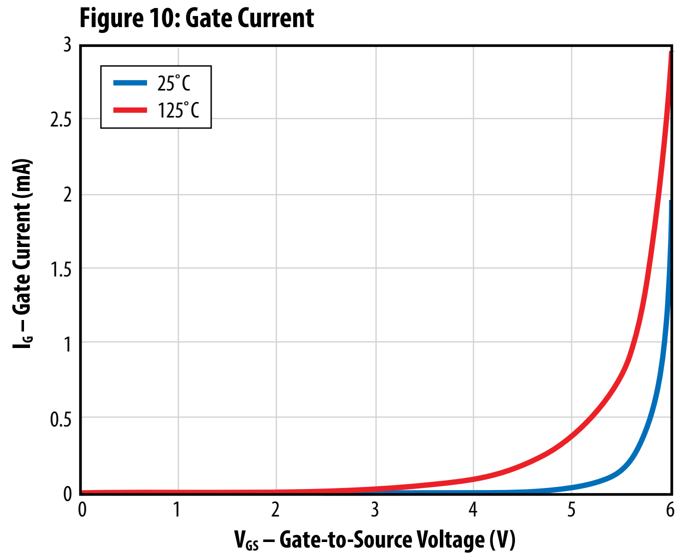
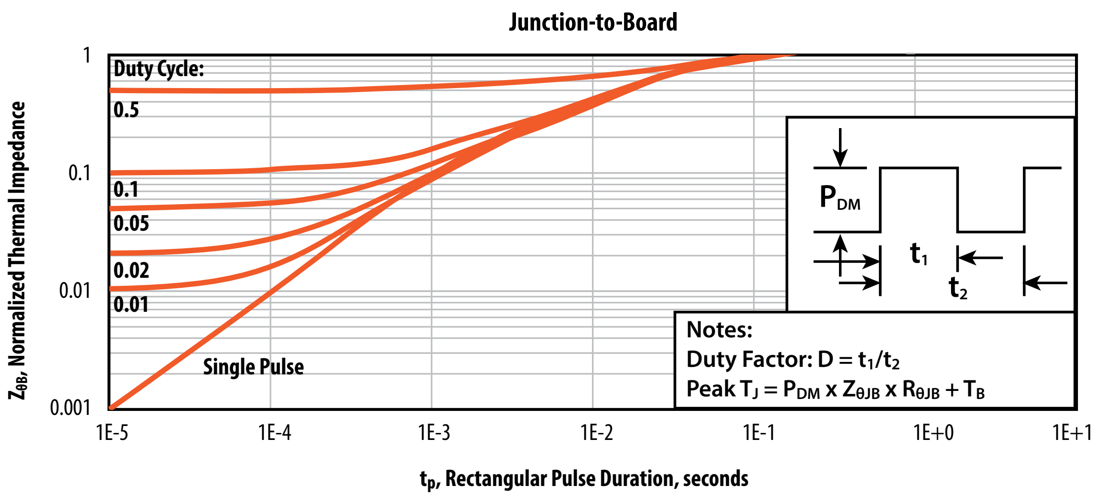


Figure 11: Transient Thermal Response Curves



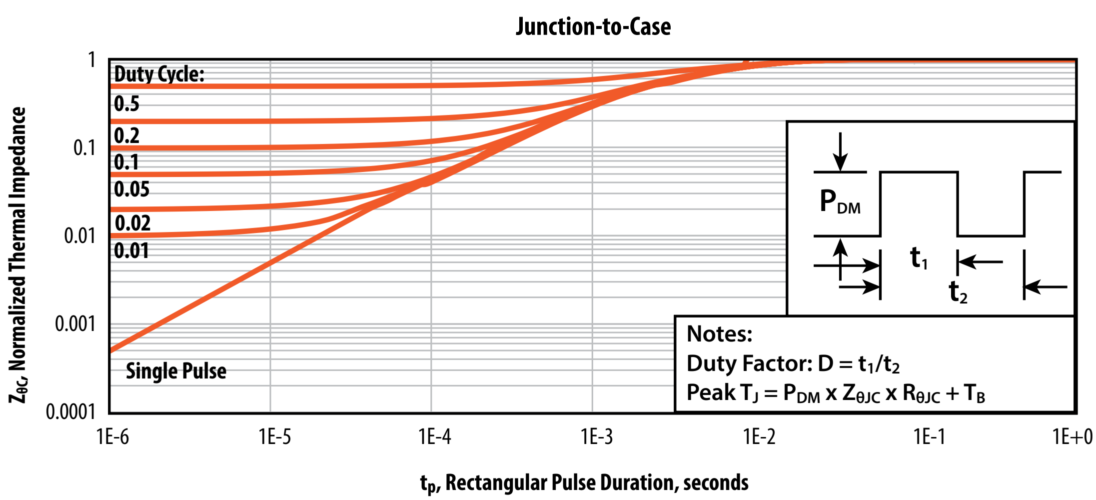
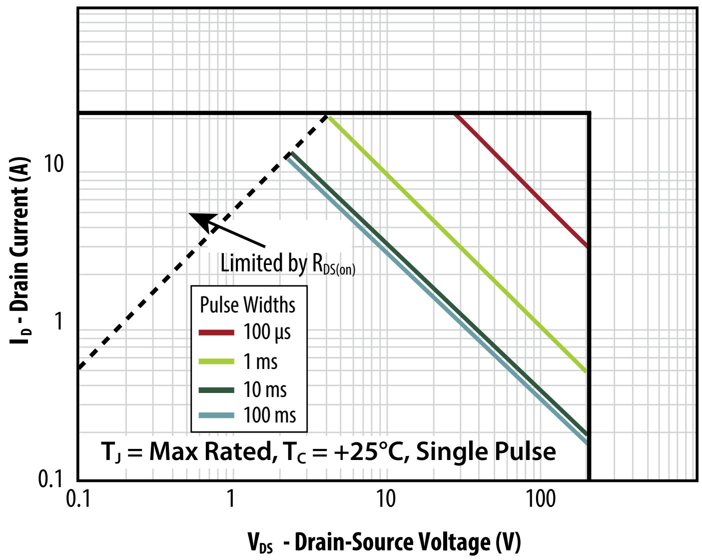
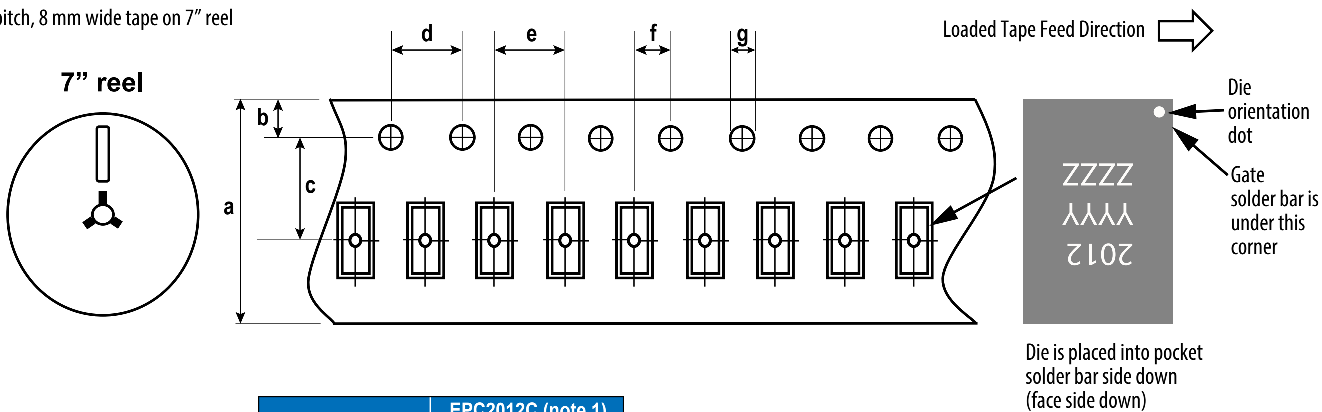


Figure 12: Safe Operating Area



TAPE AND REEL CONFIGURATION

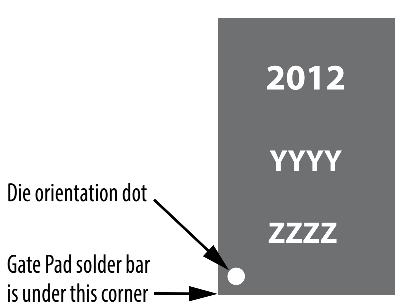
4 mm pitch, 8 mm wide tape on 7" reel



	EPC2012C (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: 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.

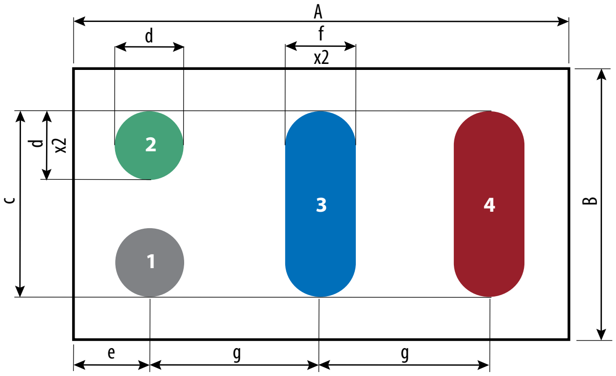
DIE MARKINGS



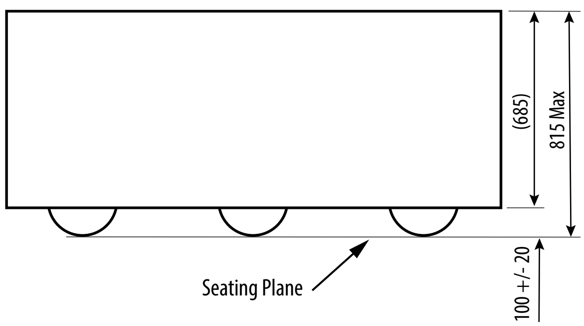
Part Number	Laser Markings		
	Part # Marking Line 1	Lot_Date Code Marking line 2	Lot_Date Code Marking Line 3
EPC2012C	2012	YYYY	ZZZZ

DIE OUTLINE

Solder Bar View



Side View



DIM	MICROMETERS		
	MIN	Nominal	MAX
A	1681	1711	1741
B	889	919	949
c	662	667	672
d	245	250	255
e	230	245	260
f	245	250	255
g	600	600	600

Pad no. 1 is Gate;

Pad no. 2 is Substrate;*

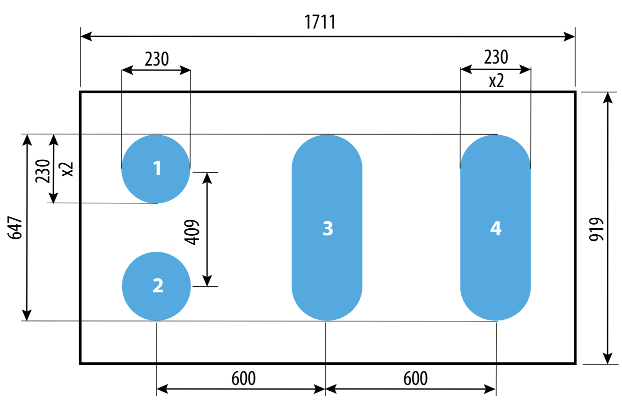
Pad no. 3 is Drain;

Pad no. 4 is Source

*Substrate pin should be connected to Source

RECOMMENDED LAND PATTERN

(units in µm)



The land pattern is solder mask defined.

Pad no. 1 is Gate;

Pad no. 2 is Substrate;*

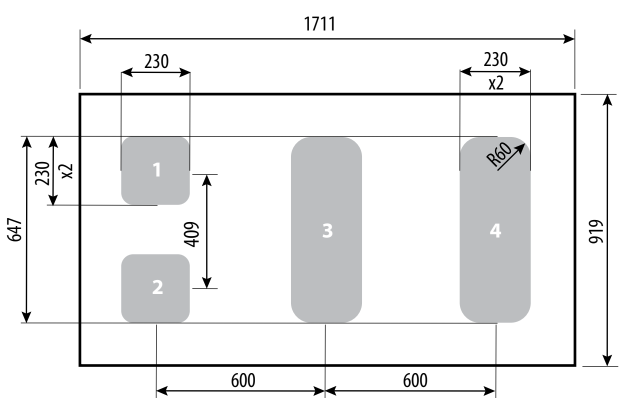
Pad no. 3 is Drain;

Pad no. 4 is Source

*Substrate pin should be connected to Source

RECOMMENDED STENCIL DRAWING

(units in µm)



Recommended stencil should be 4 mil (100 µm) thick, must be laser cut , opening per drawing. The corner has a radius of R60.

Intended for use with SAC305 Type 3 solder, reference 88.5% metals content.

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

Information subject to change without notice.
Revised April, 2021