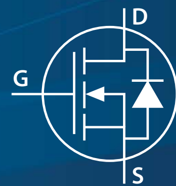
EPC2010C – Enhancement Mode Power Transistor

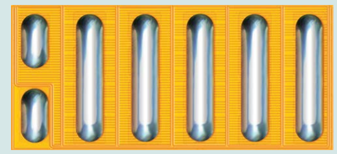
V_{DS}, 200 V
$R_{DS(on)}$, 25 mΩ
I_D, 22 A



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.



EPC2010C eGaN® FETs are supplied only in passivated die form with solder bars

Applications
- High Speed DC-DC conversion
- Class D Audio
- LiDAR

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

www.epc-co.com/epc/Products/eGaNFETs/EPC2010C.aspx

Maximum Ratings

	PARAMETER	VALUE	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	200	V
I_D	Continuous (T_A = 25˚C, $R_{θJA}$ = 5.3)	22	A
	Pulsed (25°C, T_{PULSE} = 300 µs)	90	
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	1.1	°C/W
$R_{θJB}$	Thermal Resistance, Junction to Board	2.7	
$R_{θJA}$	Thermal Resistance, Junction to Ambient (Note 1)	56	

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.

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 = 200 µA	200			V
I_{DSS}	Drain-Source Leakage	V_{GS} = 0 V, V_{DS} = 160 V		50	150	µA
I_{GSS}	Gate-to-Source Forward Leakage	V_{GS} = 5 V		1	3	mA
	Gate-to-Source Reverse Leakage	V_{GS} = -4 V		50	150	µA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 3 mA	0.8	1.4	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	V_{GS} = 5 V, I_D = 12 A		18	25	mΩ
V_{SD}	Source-Drain Forward Voltage	I_S = 0.5 A, V_{GS} = 0 V		1.7		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		380	540	pF
C_{OSS}	Output Capacitance			240	320	
C_{RSS}	Reverse Transfer Capacitance			1.8	2.7	
R_G	Gate Resistance			0.4		Ω
Q_G	Total Gate Charge	V_{DS} = 100 V, I_D = 12 A, V_{GS} = 5 V		3.7	5.3	nC
Q_{GS}	Gate-to-Source Charge	V_{DS} = 100 V, I_D = 12 A		1.3		
Q_{GD}	Gate-to-Drain Charge			0.7	1.3	
$Q_{G(TH)}$	Gate Charge at Threshold			0.9		
Q_{OSS}	Output Charge	V_{DS} = 100 V, V_{GS} = 0 V		40	52	
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

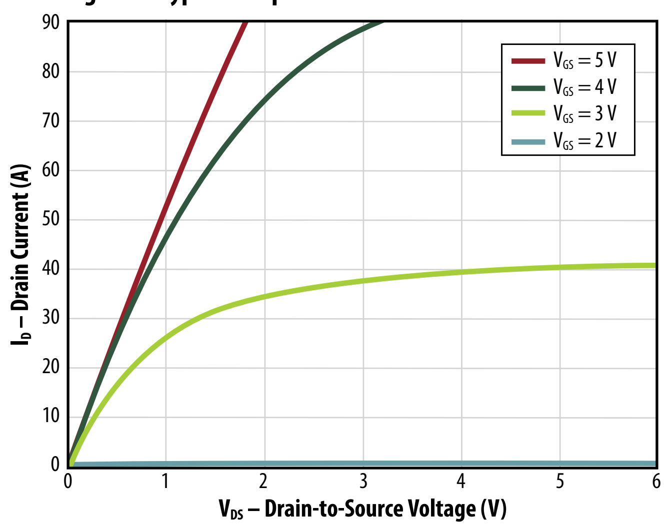


Figure 2: Transfer Characteristics

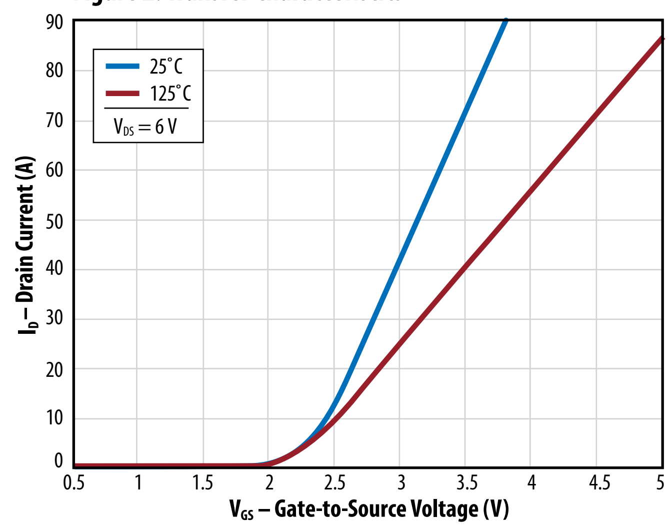


Figure 3: $R_{DS(on)}$ vs. V_{GS} for Various Drain Current

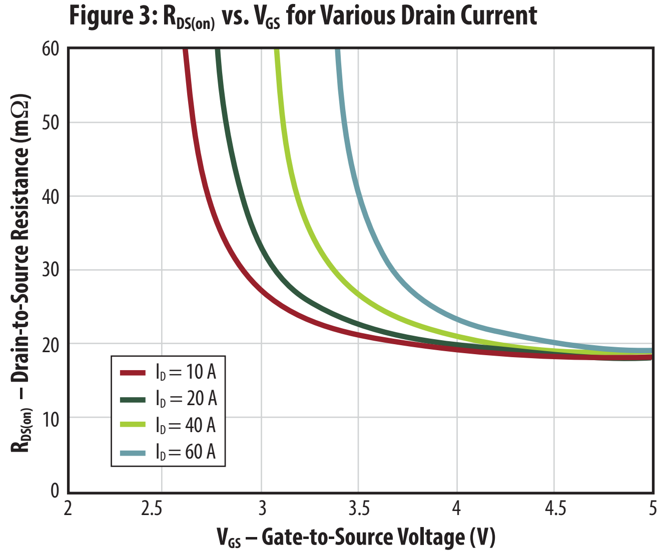


Figure 4: $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

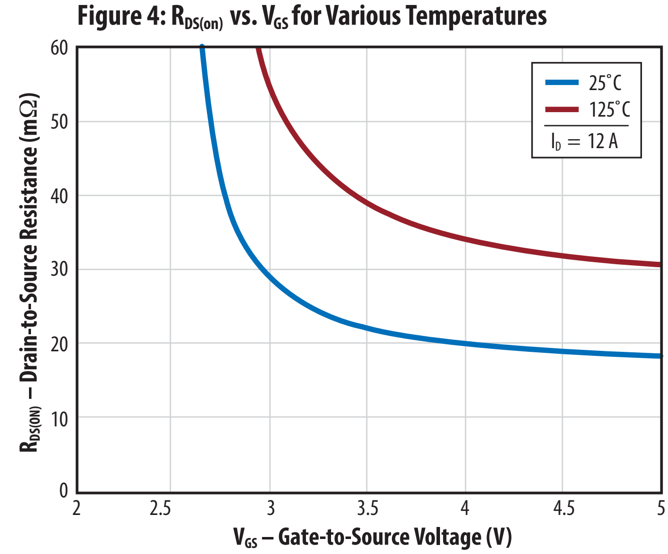


Figure 5a: Capacitance Linear Scale

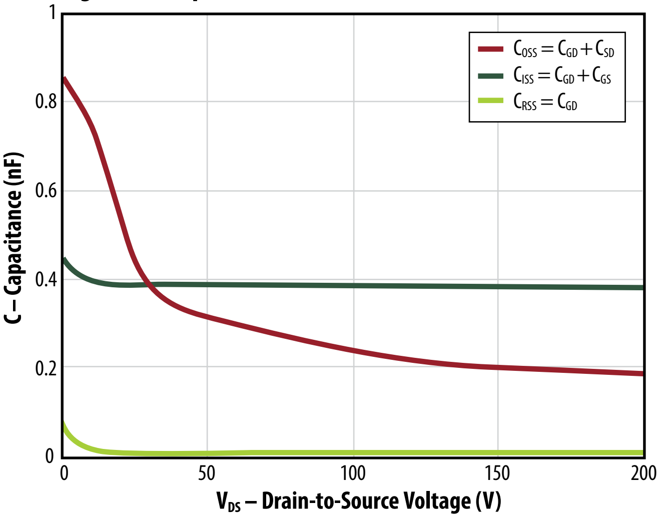


Figure 5b: Capacitance Log Scale

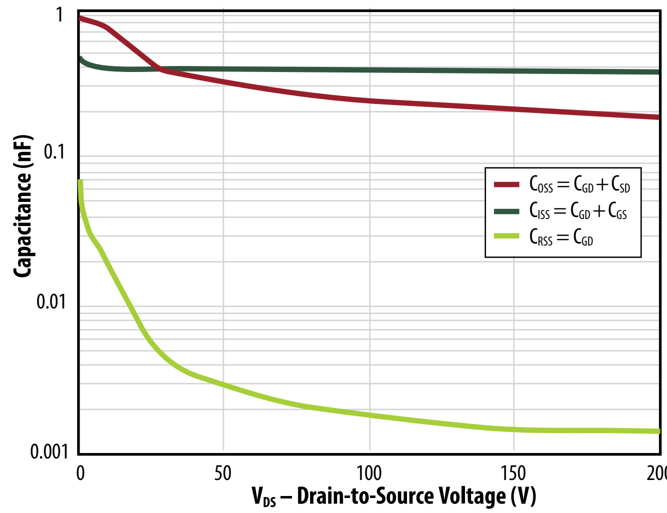


Figure 6: Gate Charge

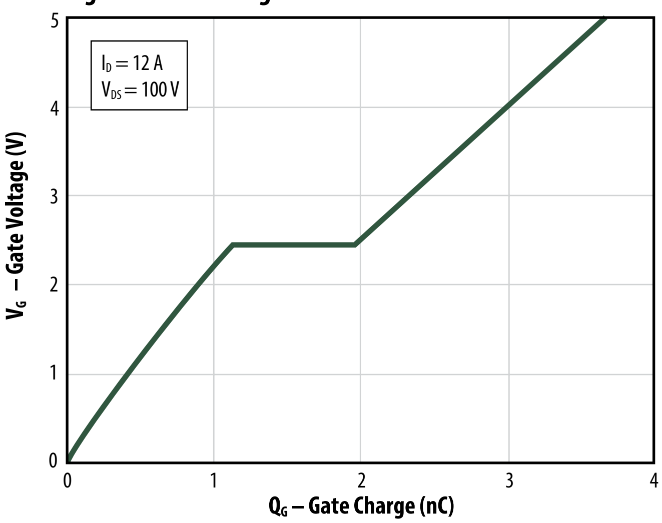


Figure 7: Reverse Drain-Source Characteristics

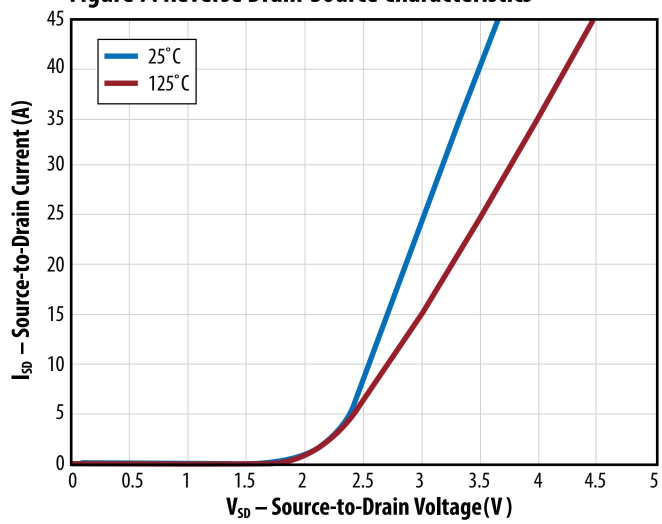


Figure 8: Normalized On Resistance vs. Temperature

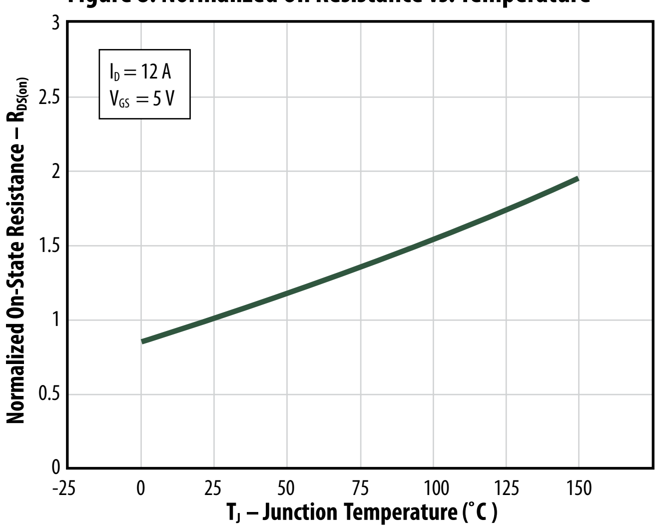


Figure 9: Normalized Threshold Voltage vs. Temperature

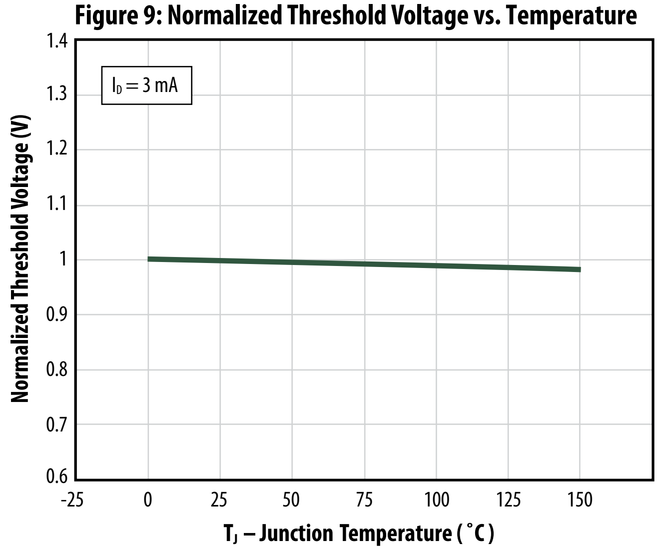


Figure 10: Gate Current

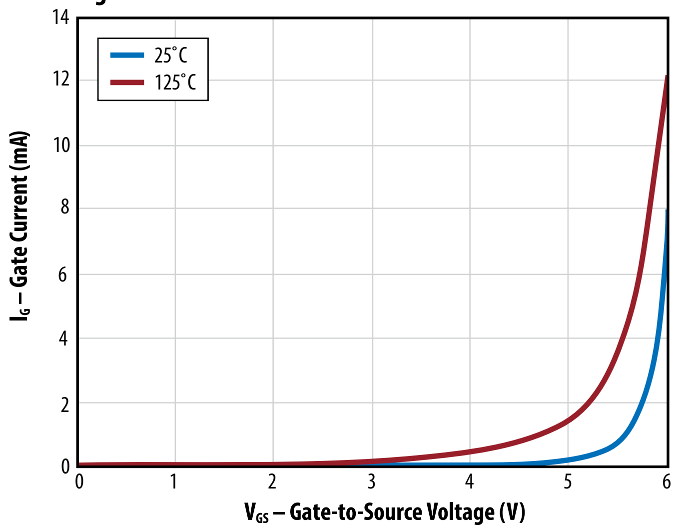
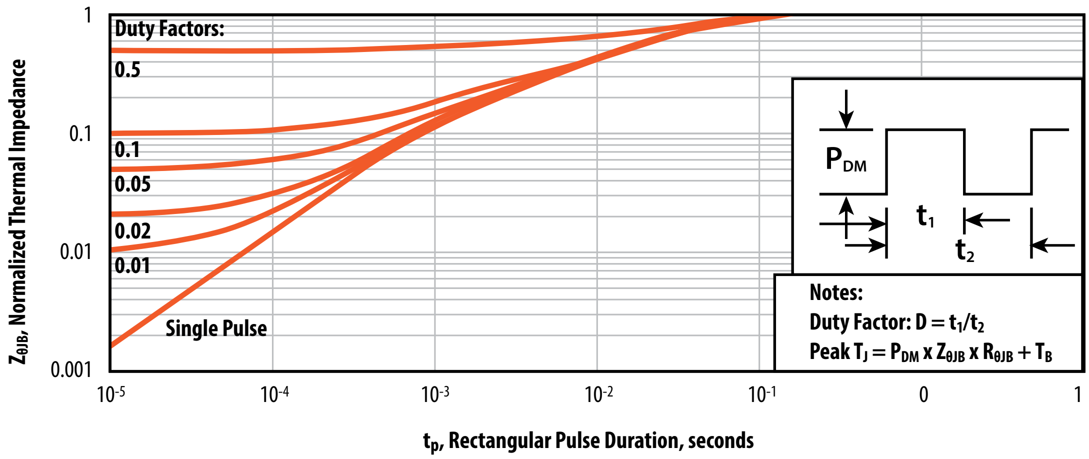


Figure 11: Transient Thermal Response Curves

Junction-to-Board



Junction-to-Case

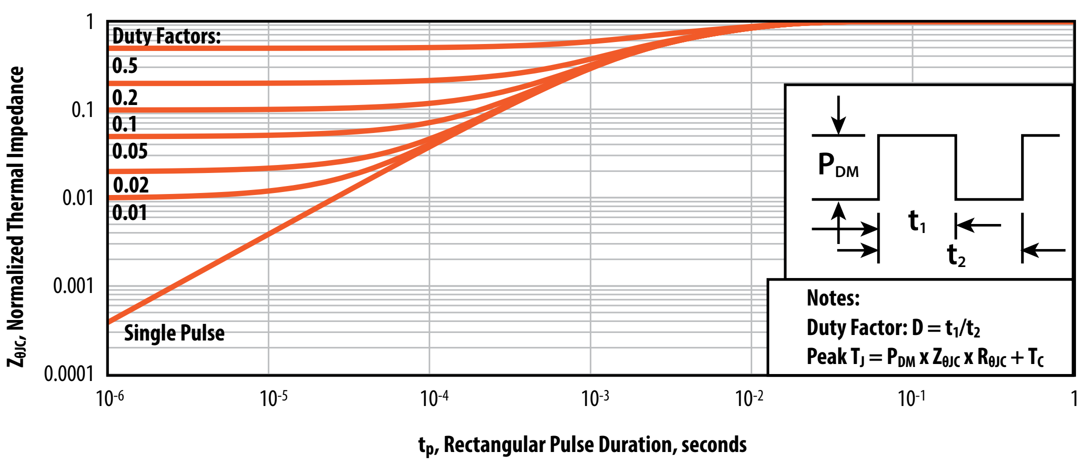
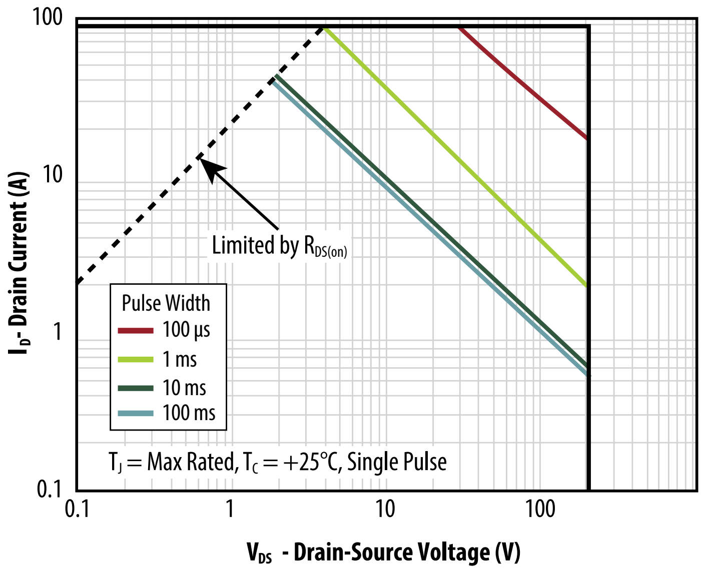
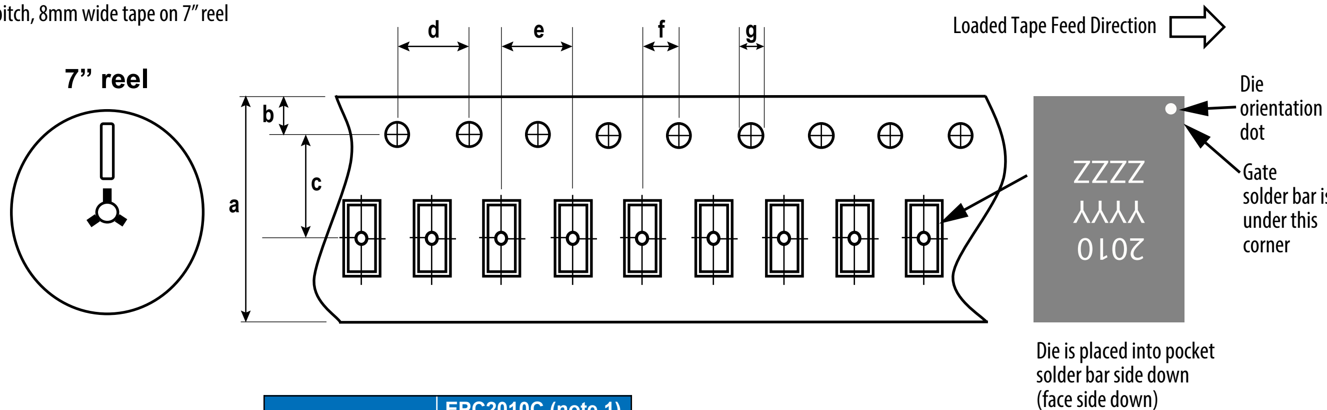


Figure 12: Safe Operating Area



TAPE AND REEL CONFIGURATION

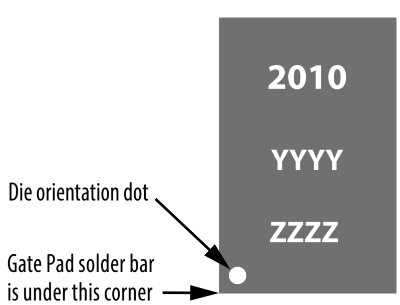
4mm pitch, 8mm wide tape on 7" reel



	EPC2010C (note 1)		
Dimension (mm)	target	min	max
a	12.00	11.9	12.3
b	1.75	1.65	1.85
c (note 2)	5.50	5.45	5.55
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.

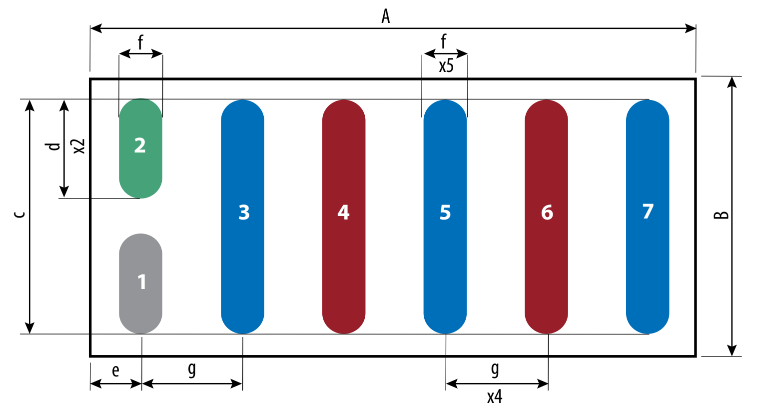
DIE MARKINGS



Part Number	Laser Markings		
	Part # Marking Line 1	Lot_Date Code Marking line 2	Lot_Date Code Marking Line 3
EPC2010C	2010	YYYY	ZZZZ

DIE OUTLINE

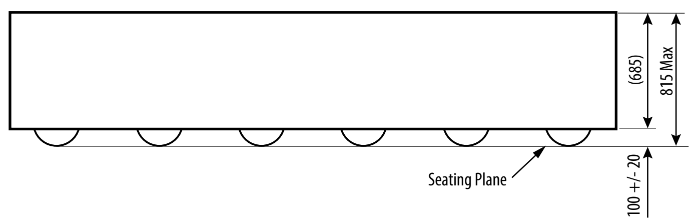
Solder Bar View



DIM	MICROMETERS		
	MIN	Nominal	MAX
A	3524	3554	3584
B	1602	1632	1662
c	1379	1382	1385
d	577	580	583
e	262	277	292
f	245	250	255
g	600	600	600

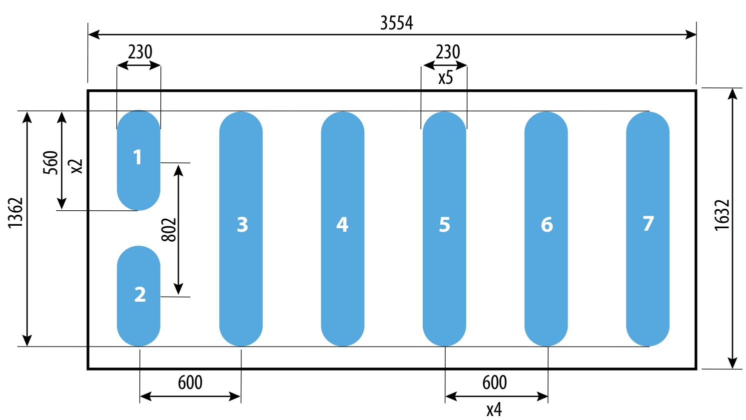
Pad no. 1 is Gate;
Pads no. 3, 5, 7 are Drain;
Pads no. 4, 6 are Source;
Pad no. 2 is Substrate.

Side View



RECOMMENDED LAND PATTERN

(units in µm)



The land pattern is solder mask defined.

Pad no. 1 is Gate;

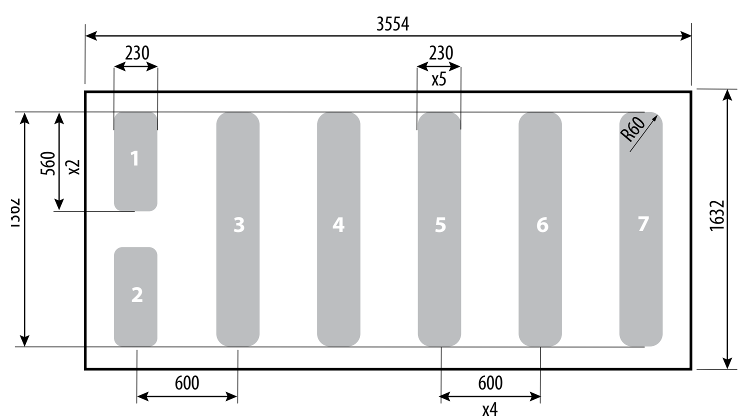
Pads no. 3, 5, 7 are Drain;

Pads no. 4, 6 are Source;

Pad no. 2 is Substrate

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 http://epc-co.com/epc/DesignSupport/AssemblyBasics.aspx

Information subject to change without notice.
Revised October, 2018