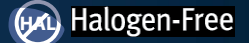


# EPC2001C – Enhancement Mode Power Transistor

 $V_{DS}, 100\text{ V}$ 
 $R_{DS(on)}, 7\text{ m}\Omega$ 
 $I_D, 36\text{ A}$ 


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.

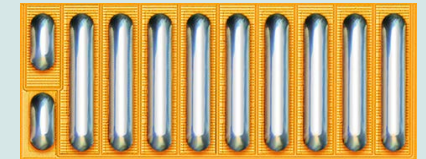
Maximum Ratings			
PARAMETER		VALUE	UNIT
$V_{DS}$	Drain-to-Source Voltage (Continuous)	100	V
	Drain-to-Source Voltage (up to 10,000 5 ms pulses at 150°C)	120	
$I_D$	Continuous ( $T_A = 25^\circ\text{C}$ , $R_{\theta JA} = 7.3$ )	36	A
	Pulsed ( $25^\circ\text{C}$ , $T_{PULSE} = 300\text{ }\mu\text{s}$ )	150	
$V_{GS}$	Gate-to-Source Voltage	6	V
	Gate-to-Source Voltage	-4	
$T_J$	Operating Temperature	-40 to 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	-40 to 150	

Thermal Characteristics			
PARAMETER		TYP	UNIT
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1	$^\circ\text{C}/\text{W}$
$R_{\theta JB}$	Thermal Resistance, Junction-to-Board	2	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	54	

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](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	$V_{GS} = 0\text{ V}$ , $I_D = 300\text{ }\mu\text{A}$	100			V
$I_{DSS}$	Drain-Source Leakage	$V_{GS} = 0\text{ V}$ , $V_{DS} = 80\text{ V}$		100	250	$\mu\text{A}$
$I_{GSS}$	Gate-to-Source Forward Leakage	$V_{GS} = 5\text{ V}$		1	5	mA
	Gate-to-Source Reverse Leakage	$V_{GS} = -4\text{ V}$		0.1	0.25	
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 5\text{ mA}$	0.8	1.4	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS} = 5\text{ V}$ , $I_D = 25\text{ A}$		5.6	7	$\text{m}\Omega$
$V_{SD}$	Source-Drain Forward Voltage	$I_S = 0.5\text{ A}$ , $V_{GS} = 0\text{ V}$		1.7		V

All measurements were done with substrate connected to source.



EPC2001C eGaN® FETs are supplied only in passivated die form with solder bars

## Applications

- High-Frequency DC-DC Conversion
- Industrial Automation
- Synchronous Rectification
- Class-D Audio
- Low Inductance Motor Drives

## Benefits

- Ultra High Efficiency
- Ultra Low Switching and Conduction Losses
- Zero  $Q_{RR}$
- Ultra Small Footprint

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$C_{ISS}$	Input Capacitance	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$		770	900	pF
$C_{OSS}$	Output Capacitance			430	650	
$C_{RSS}$	Reverse Transfer Capacitance			10	15	
$R_G$	Gate Resistance			0.3		$\Omega$
$Q_G$	Total Gate Charge	$V_{DS} = 50\text{ V}, V_{GS} = 5\text{ V}, I_D = 25\text{ A}$		7.5	9	nC
$Q_{GS}$	Gate-to-Source Charge	$V_{DS} = 50\text{ V}, I_D = 25\text{ A}$		2.4		
$Q_{GD}$	Gate-to-Drain Charge			1.2	2	
$Q_{G(TH)}$	Gate Charge at Threshold			1.6		
$Q_{OSS}$	Output Charge	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$		31	45	
$Q_{RR}$	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%  $BV_{DSS}$ .

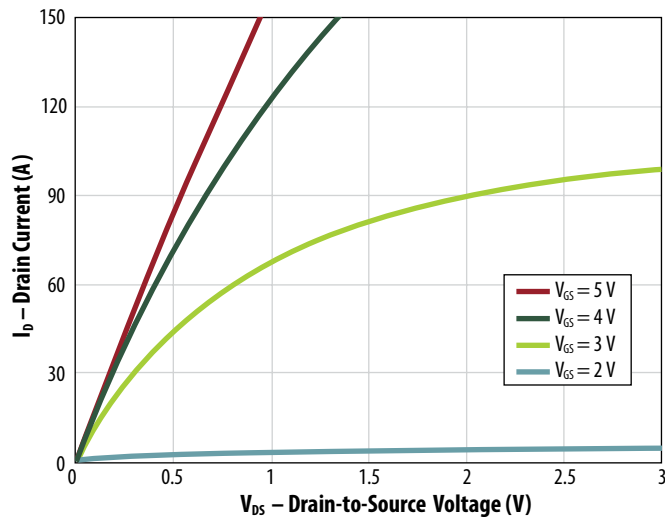
Figure 1: Typical Output Characteristics at  $25^\circ\text{C}$ 

Figure 2: Transfer Characteristics

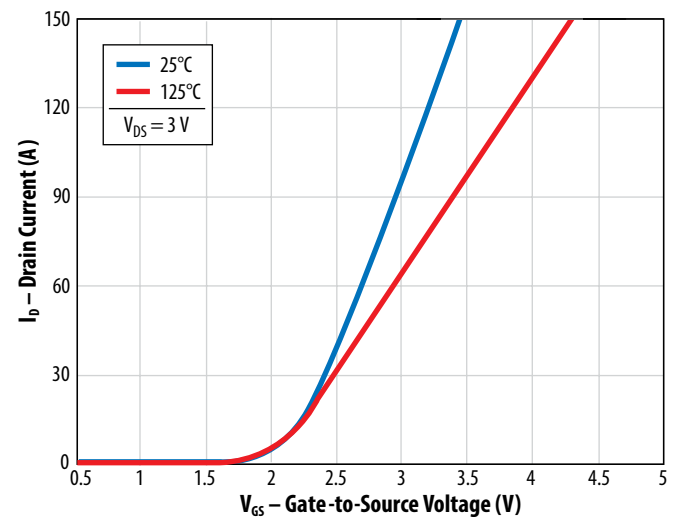
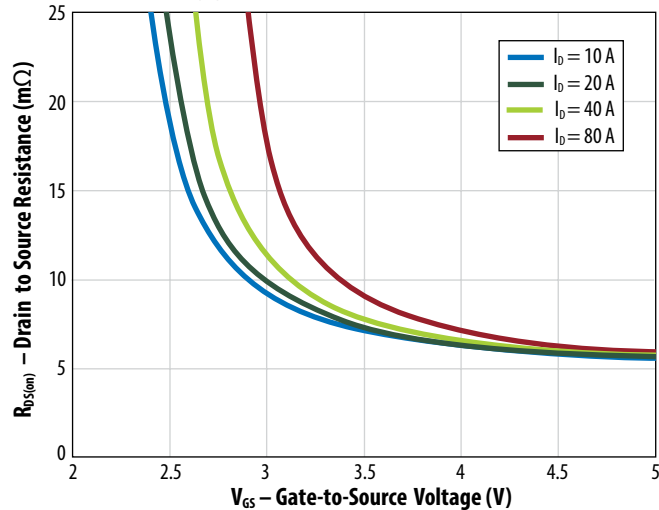
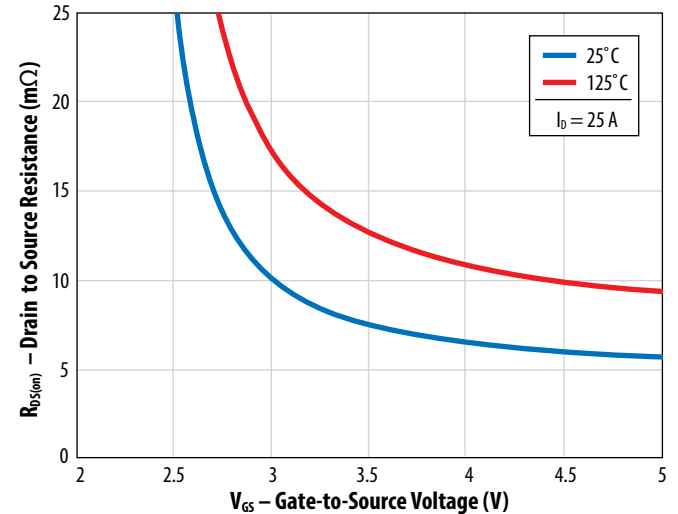
Figure 3:  $R_{DS(on)}$  vs.  $V_{GS}$  for Various CurrentsFigure 4:  $R_{DS(on)}$  vs.  $V_{GS}$  for Various Temperatures

Figure 5a: Capacitance (Linear Scale)

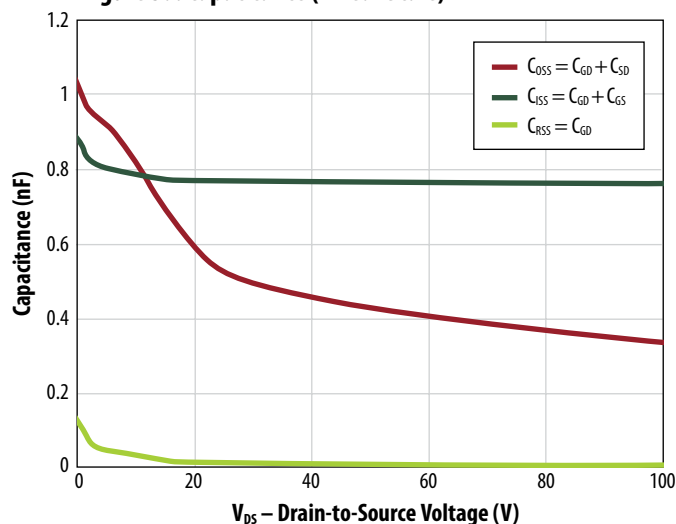


Figure 5b: Capacitance (Log Scale)

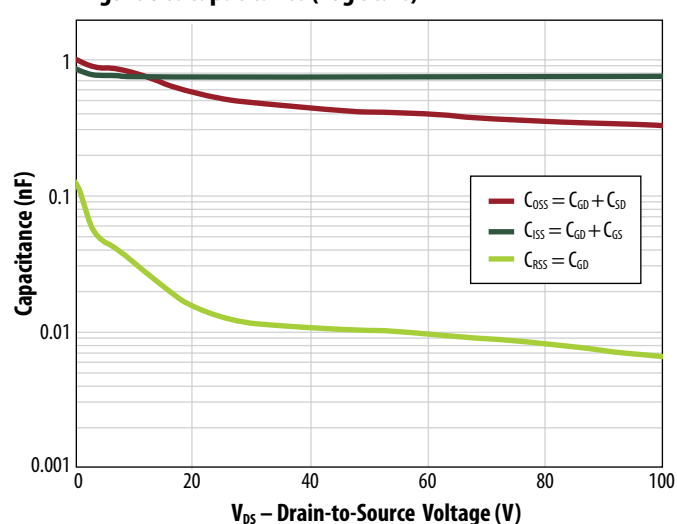


Figure 6: Gate Charge

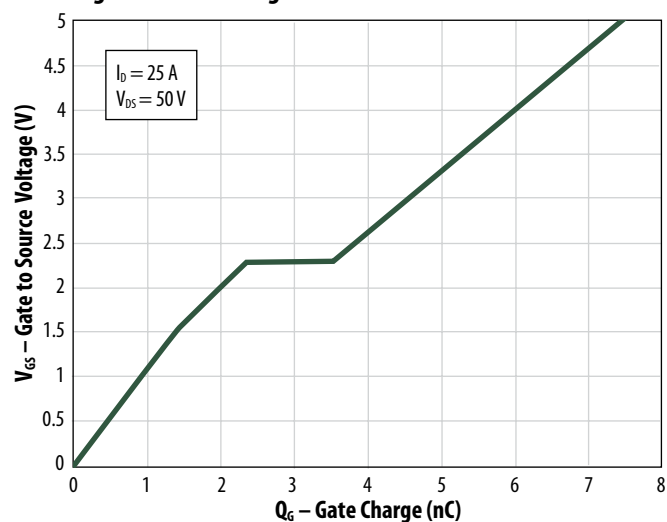


Figure 7: Reverse Drain-Source Characteristics

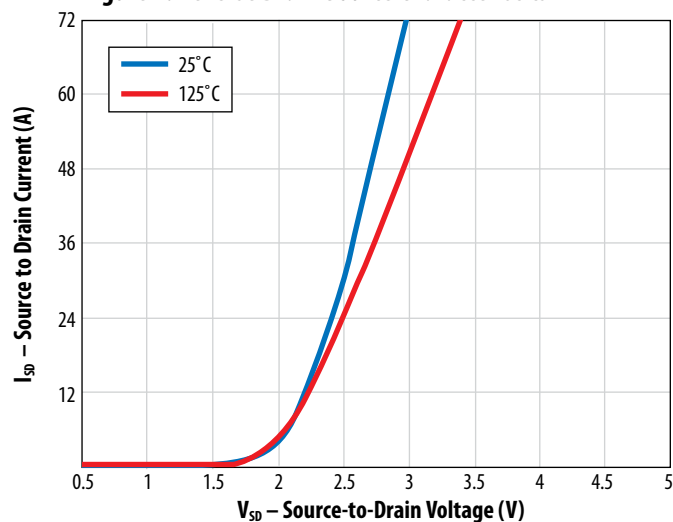


Figure 8: Normalized On Resistance vs. Temperature

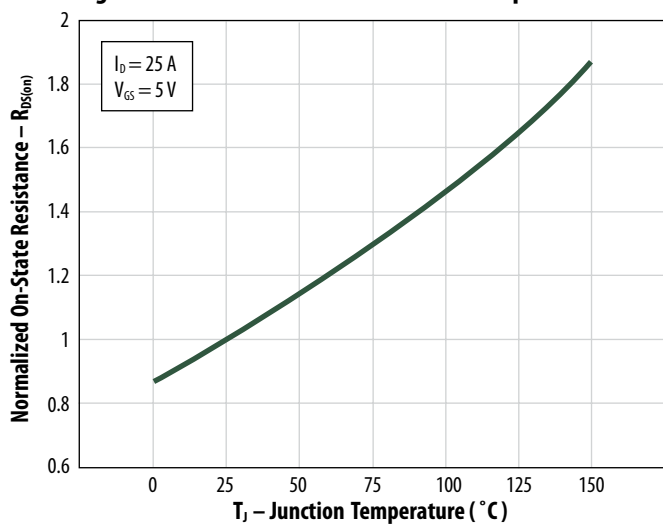


Figure 9: Normalized Threshold Voltage vs. Temperature

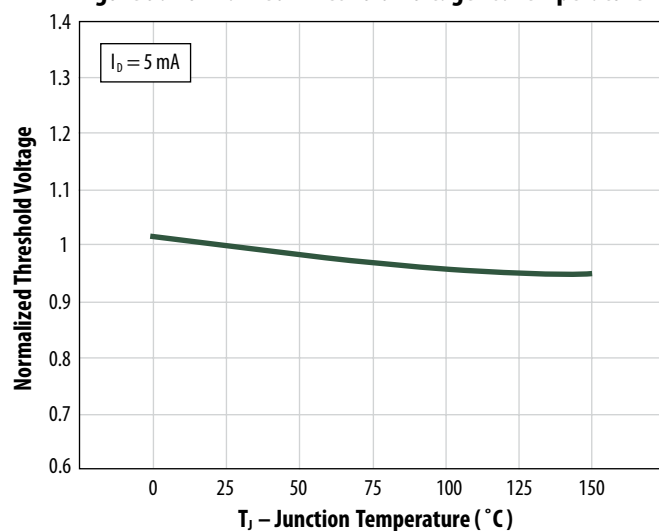


Figure 10: Gate Current

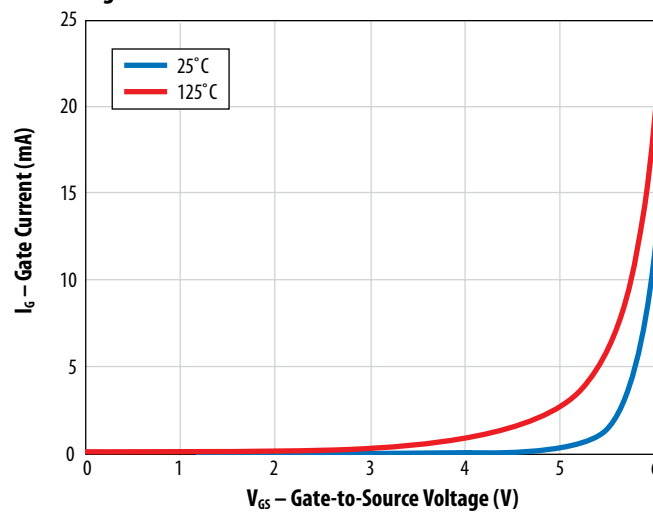


Figure 11: Transient Thermal Response Curves

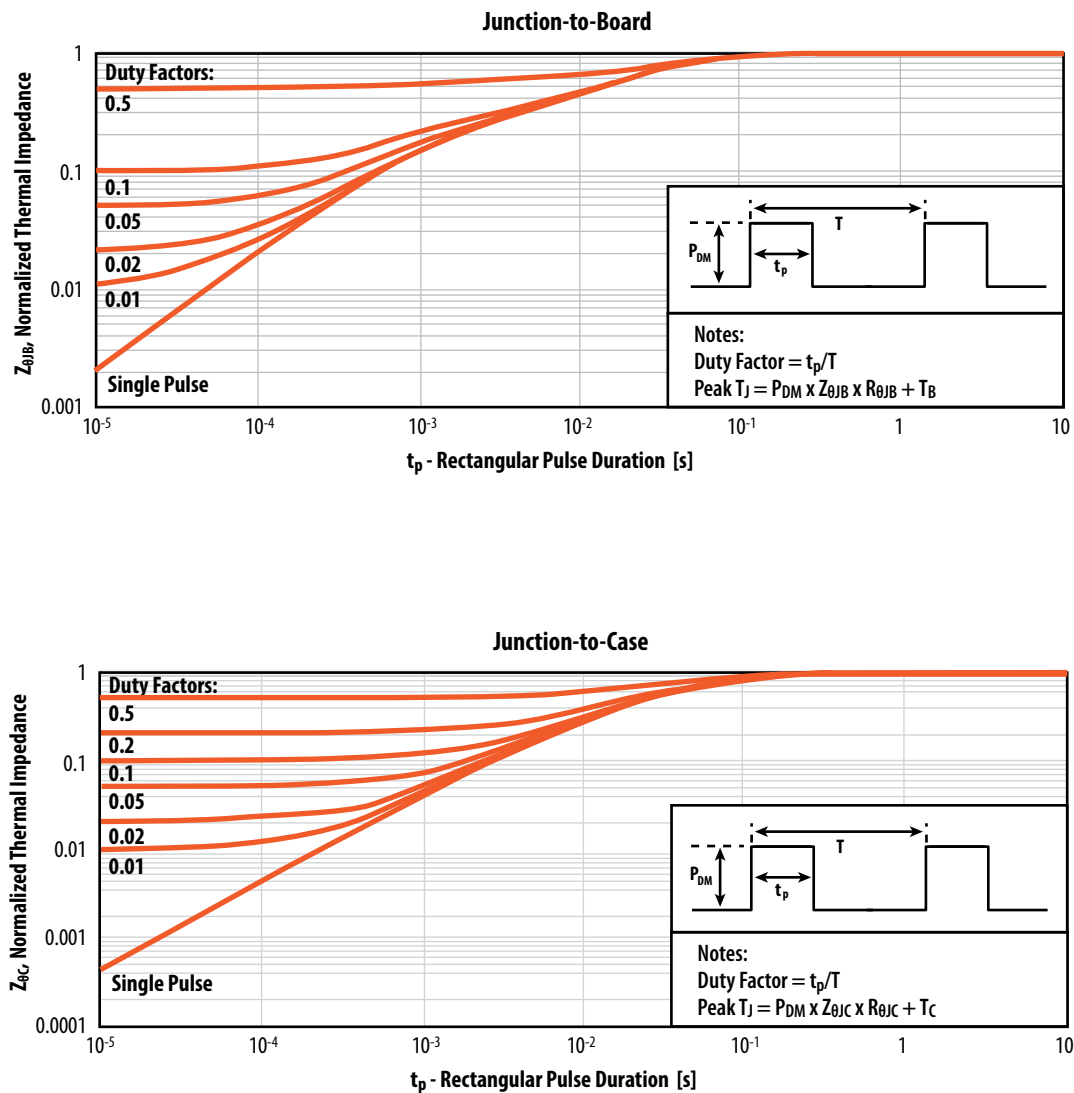
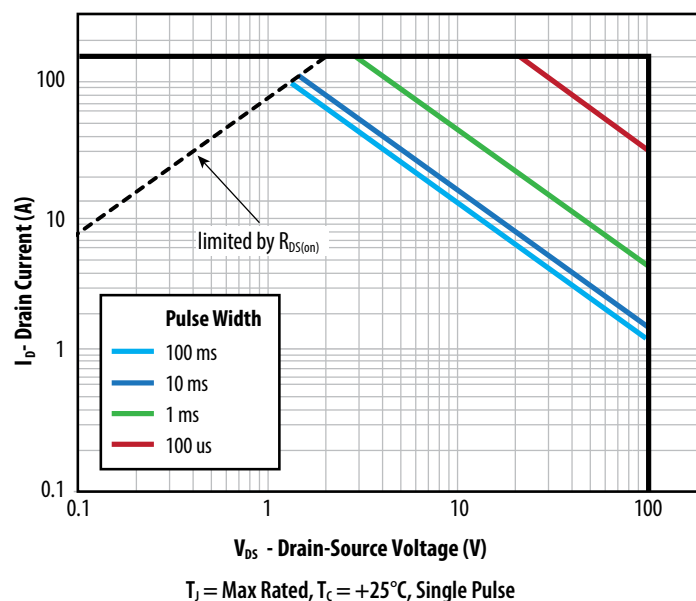
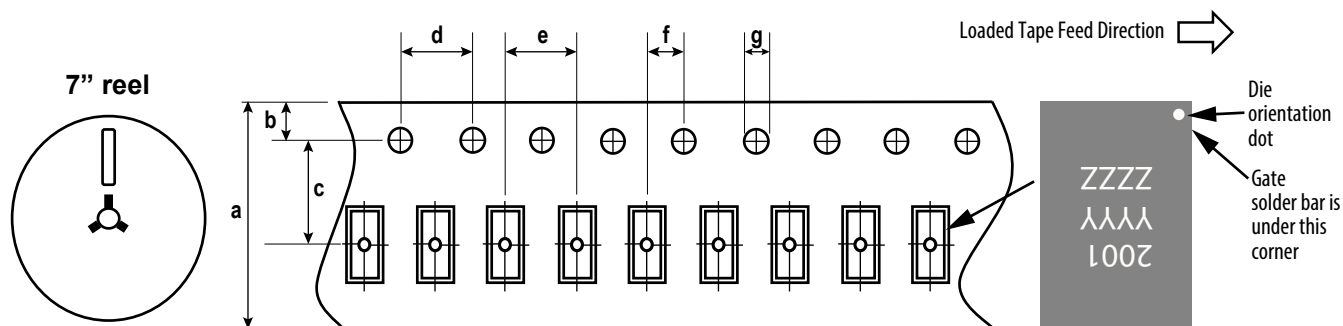


Figure 12: Safe Operating Area



## TAPE AND REEL CONFIGURATION

4 mm pitch, 12 mm wide tape on 7" reel

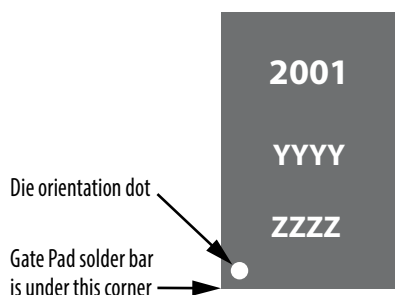


Dimension (mm)	EPC2001C (note 1)		
	target	min	max
a	12.0	11.7	12.3
b	1.75	1.65	1.85
c (note 2)	5.50	5.45	5.55
d	4.00	3.90	4.10
e	4.00	3.90	4.10
f (note 2)	2.00	1.95	2.05
g	1.5	1.5	1.6

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

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.

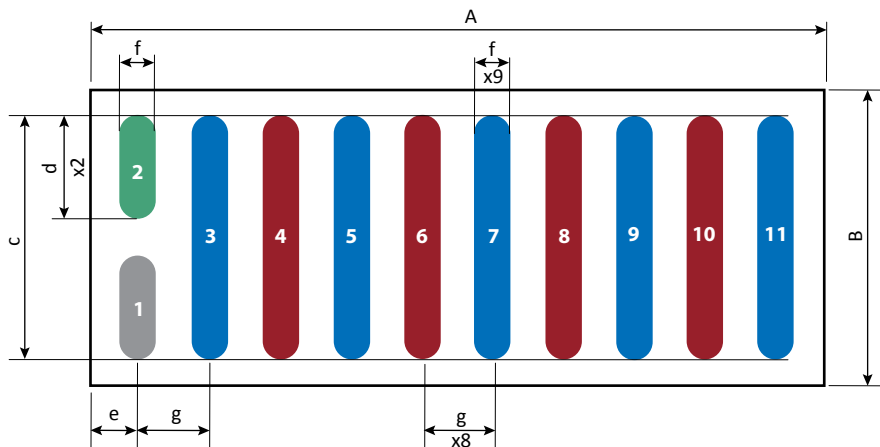
## DIE MARKINGS



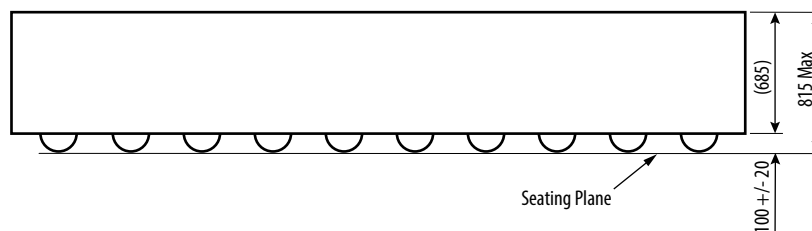
Part Number	Laser Markings		
	Part # Marking Line 1	Lot_Date Code Marking line 2	Lot_Date Code Marking Line 3
EPC2001C	2001	YYYY	ZZZZ

**DIE OUTLINE**

Solder Bar View



Side View



DIM	MICROMETERS		
	MIN	Nominal	MAX
A	4075	4105	4135
B	1602	1635	1662
C	1379	1382	1385
D	577	580	583
E	235	250	265
F	195	200	205
G	400	400	400

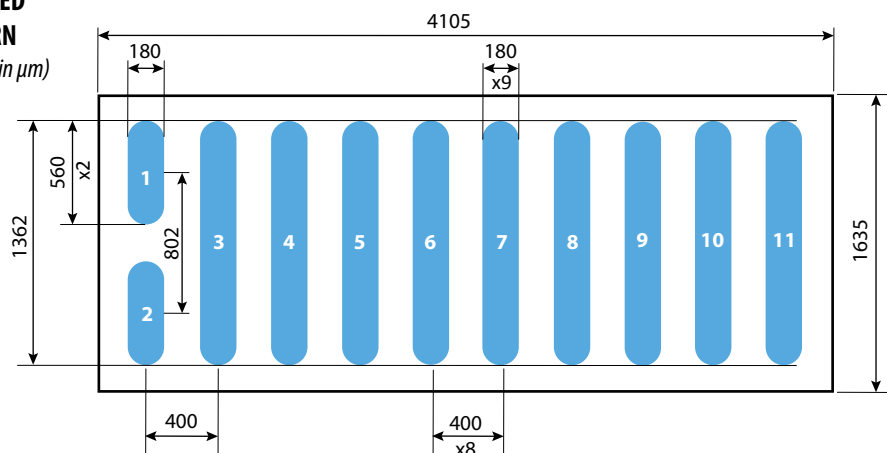
Pad no. 1 is Gate;

Pads no. 3, 5, 7, 9, 11 are Drain;

Pads no. 4, 6, 8, 10 are Source;

Pad no. 2 is Substrate.\*

\*Substrate pin should be connected to Source

**RECOMMENDED****LAND PATTERN**(measurements in  $\mu\text{m}$ )

The land pattern is solder mask defined.

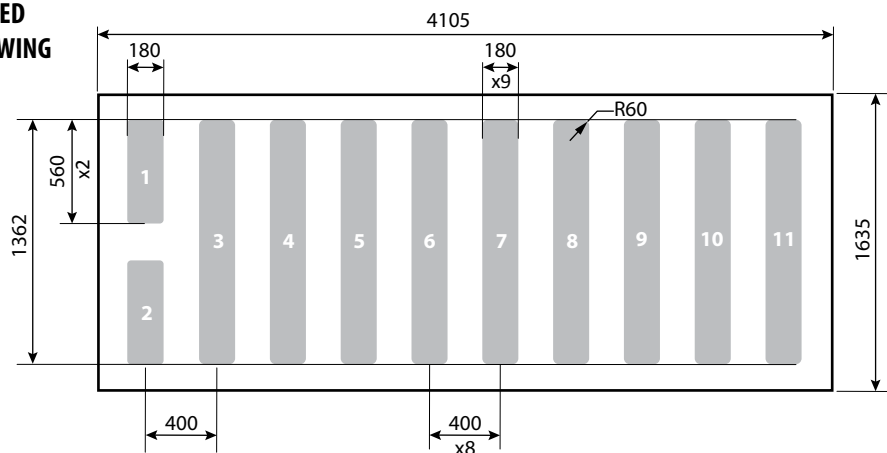
Pad no. 1 is Gate;

Pads no. 3, 5, 7, 9, 11 are Drain;

Pads no. 4, 6, 8, 10 are Source;

Pad no. 2 is Substrate.\*

\*Substrate pin should be connected to Source

**RECOMMENDED****STENCIL DRAWING**(units in  $\mu\text{m}$ )

Recommended stencil should be 4 mil (100  $\mu\text{m}$ ) 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>

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