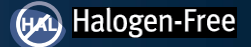


EPC2207 – Enhancement Mode Power Transistor

 $V_{DS}, 200\text{ V}$
 $R_{DS(on)}, 22\text{ m}\Omega$
 $I_D, 14\text{ A}$


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)	200	V
I_D	Continuous ($T_A = 25^\circ\text{C}$)	14	A
	Pulsed ($25^\circ\text{C}, T_{PULSE} = 300\ \mu\text{s}$)	54	
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	1.4	$^\circ\text{C}/\text{W}$
$R_{\theta JB}$	Thermal Resistance, Junction-to-Board	5.1	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	72	

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.



EPC2207 eGaN® FETs are supplied only in passivated die form with solder bars. Die Size: 2.8 x 0.9 mm

Applications

- DC-DC Converters
- BLDC Motor Drives
- Sync Rectification for AC/DC and DC-DC
- Multi-level AC/DC Power Supplies
- Wireless Power
- Solar Micro Inverters
- Robotics
- Class-D Audio

Benefits

- Ultra High Efficiency
- No Reverse Recovery
- Ultra Low Q_G
- Small Footprint



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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-to-Source Voltage	$V_{GS} = 0\text{ V}, I_D = 0.2\text{ mA}$	200			V
I_{DSS}	Drain-Source Leakage	$V_{GS} = 0\text{ V}, V_{DS} = 160\text{ V}$		0.05	0.16	mA
I_{GSS}	Gate-to-Source Forward Leakage	$V_{GS} = 5\text{ V}$		0.01	1.3	
	Gate-to-Source Forward Leakage [#]	$V_{GS} = 5\text{ V}, T_J = 125^\circ\text{C}$		0.16	2.9	
	Gate-to-Source Reverse Leakage	$V_{GS} = -4\text{ V}$		0.05	0.16	
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 2\text{ mA}$	0.8	1.1	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS} = 5\text{ V}, I_D = 14\text{ A}$		15	22	m Ω
V_{SD}	Source-Drain Forward Voltage [#]	$I_S = 0.5\text{ A}, V_{GS} = 0\text{ V}$		1.7		V

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

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
C_{ISS}	Input Capacitance	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$		454	600	pF
C_{RSS}	Reverse Transfer Capacitance			0.7		
C_{OSS}	Output Capacitance			130	195	
$C_{OSS(ER)}$	Effective Output Capacitance, Energy Related (Note 2)	$V_{DS} = 0\text{ to }100\text{ V}, V_{GS} = 0\text{ V}$		186		
$C_{OSS(TR)}$	Effective Output Capacitance, Time Related (Note 3)			234		
R_G	Gate Resistance			0.3		Ω
Q_G	Total Gate Charge	$V_{DS} = 100\text{ V}, V_{GS} = 5\text{ V}, I_D = 14\text{ A}$		4.5	5.9	nC
Q_{GS}	Gate-to-Source Charge	$V_{DS} = 100\text{ V}, I_D = 14\text{ A}$		1.3		
Q_{GD}	Gate-to-Drain Charge			0.7		
$Q_{G(TH)}$	Gate Charge at Threshold			0.8		
Q_{OSS}	Output Charge	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$		23	35	
Q_{RR}	Source-Drain Recovery Charge			0		

Defined by design. Not subject to production test.

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

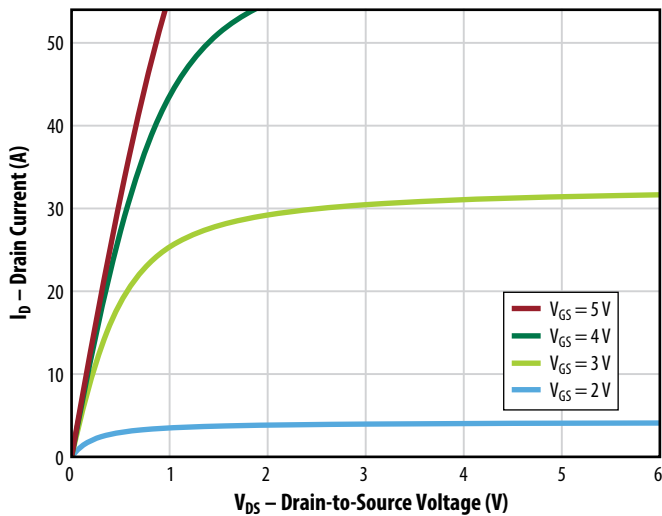


Figure 2: Typical Transfer Characteristics

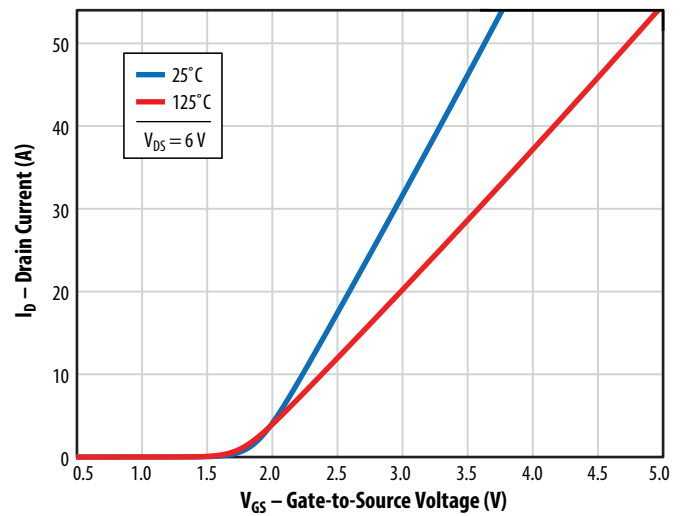


Figure 3: $R_{DS(on)}$ vs. V_{GS} for Various Drain Currents

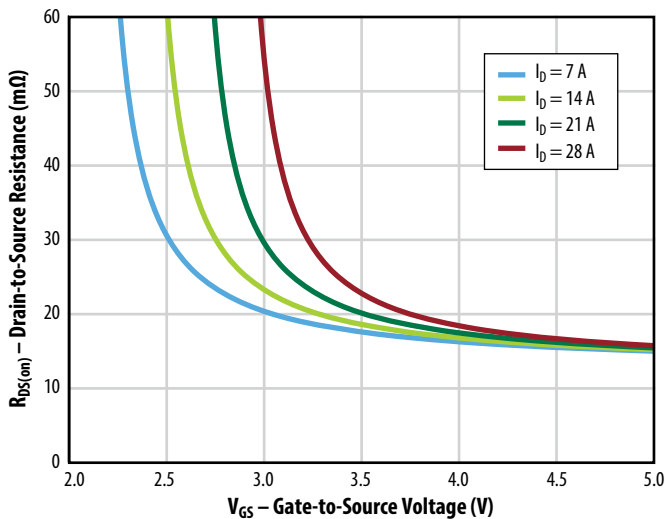


Figure 4: $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

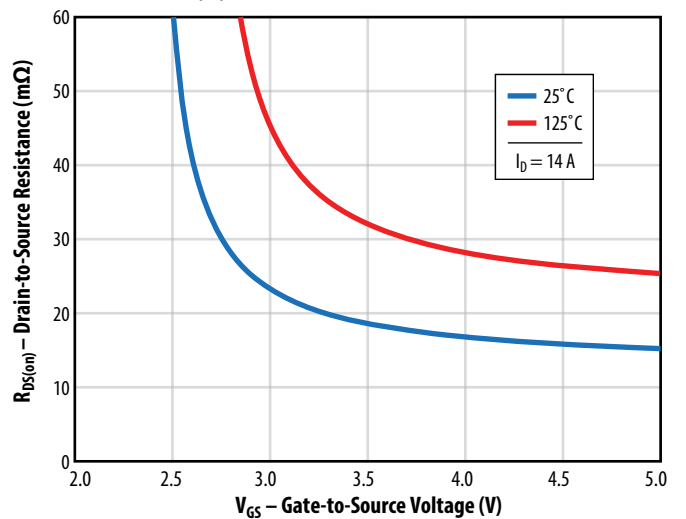


Figure 5a: Typical Capacitance (Linear Scale)

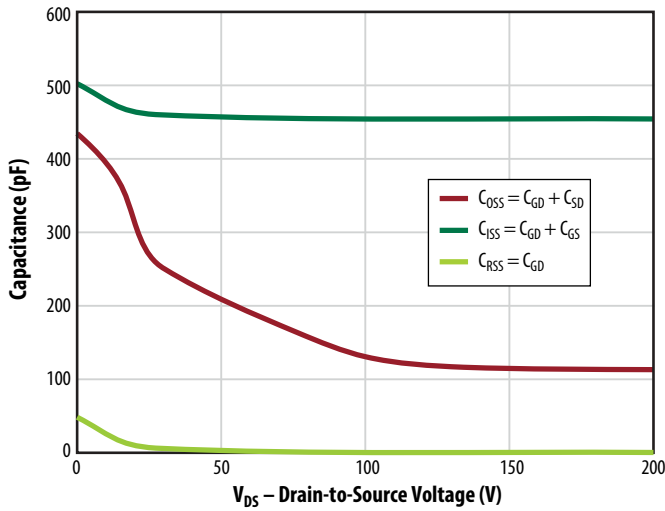


Figure 5b: Typical Capacitance (Log Scale)

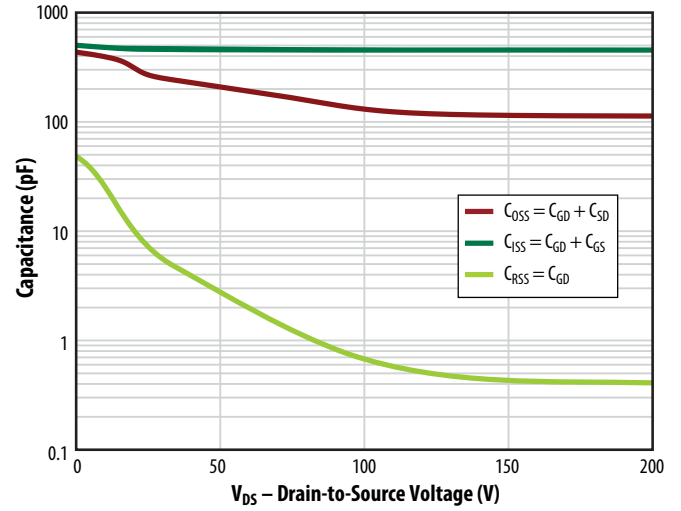


Figure 6: Typical Output Charge and C_{OSS} Stored Energy

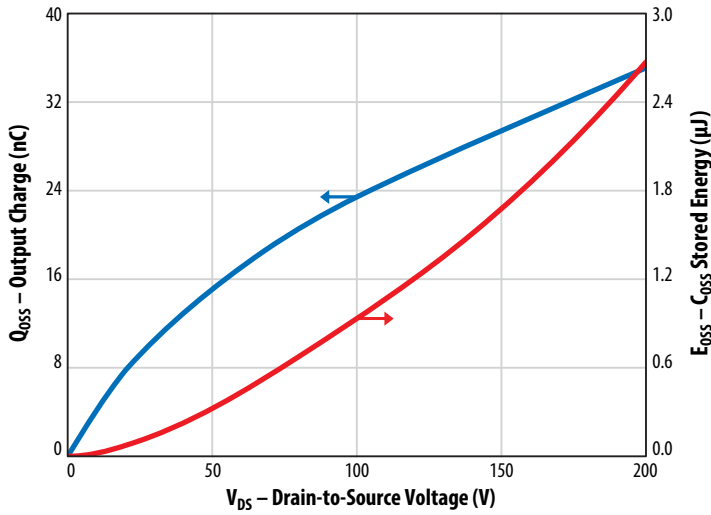


Figure 7: Typical Gate Charge

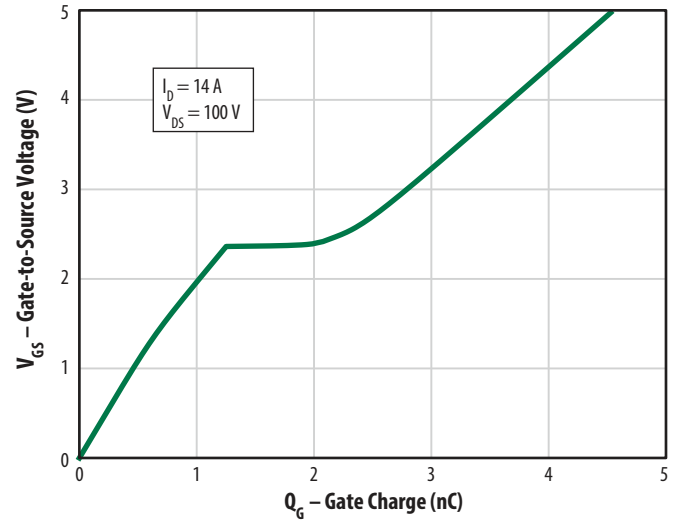


Figure 8: Reverse Drain-Source Characteristics

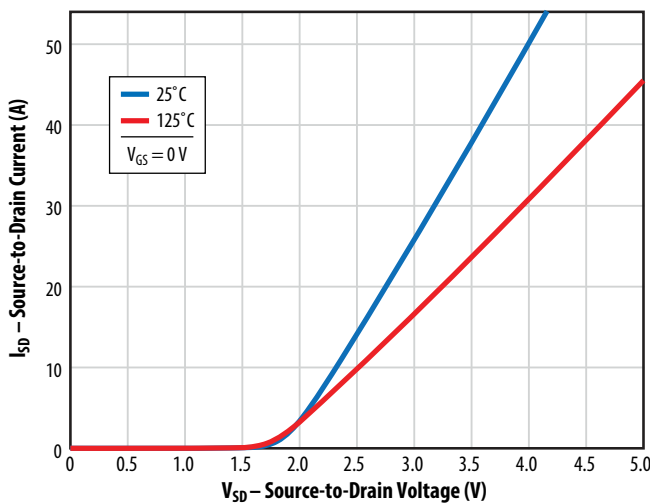
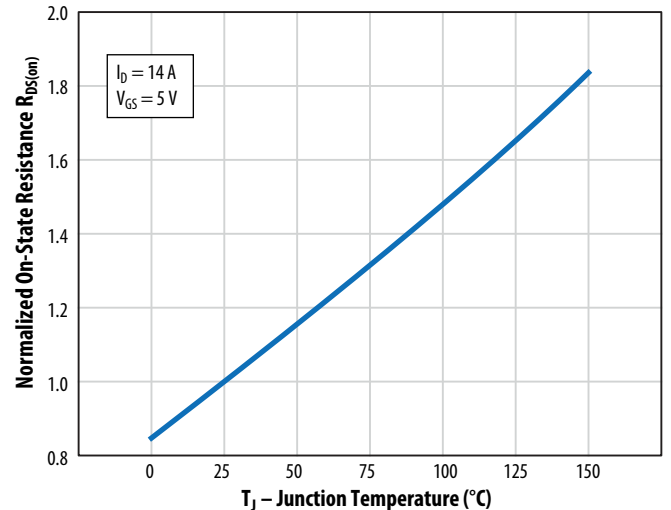


Figure 9: Normalized On-State Resistance vs. Temperature



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

Figure 10: Normalized Threshold Voltage vs. Temperature

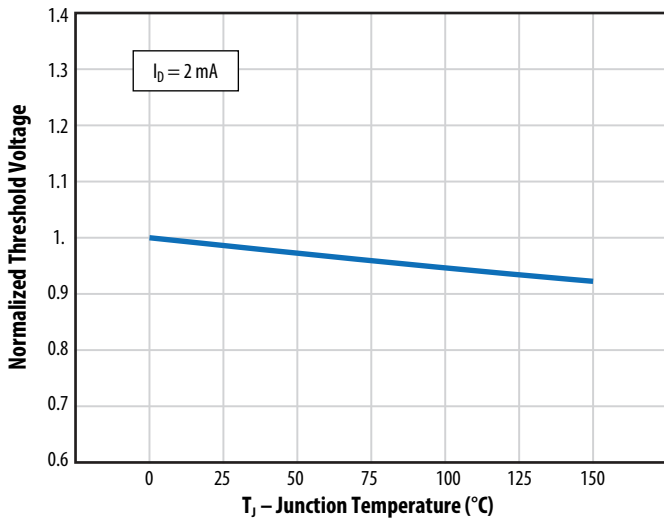


Figure 11: Safe Operating Area

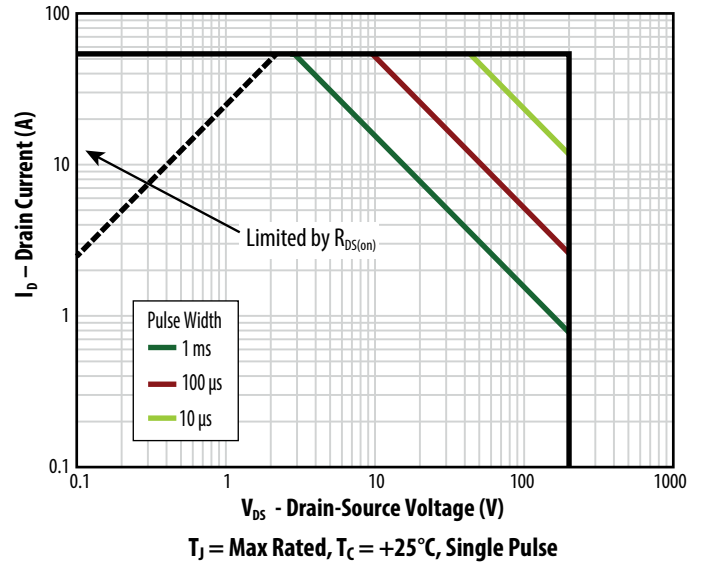
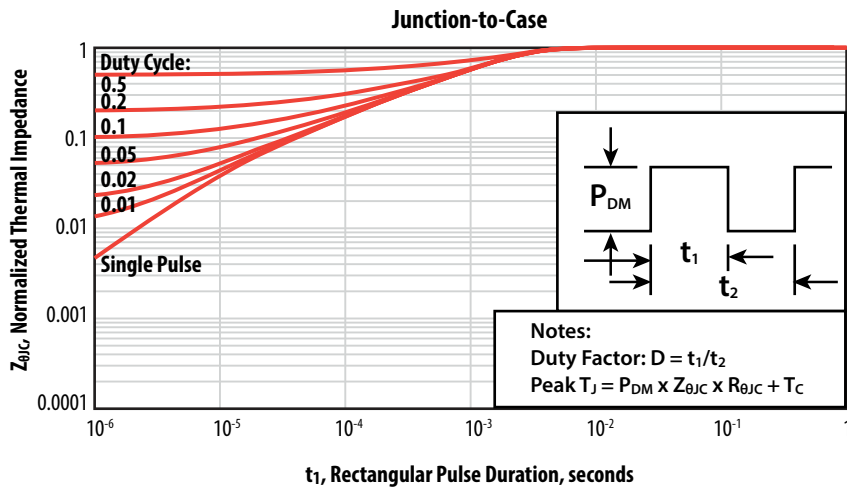
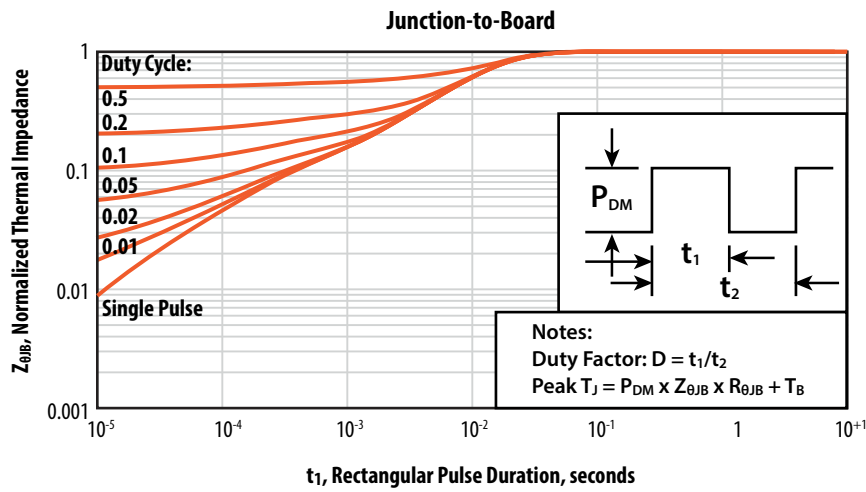
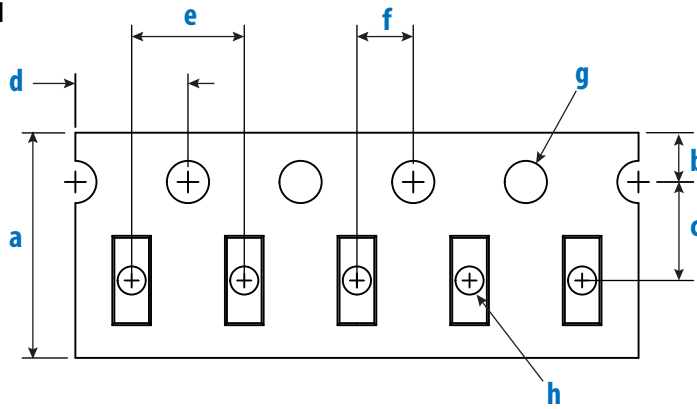
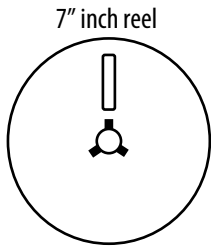


Figure 12: Transient Thermal Response Curves



TAPE AND REEL CONFIGURATION

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



Loaded Tape Feed Direction →



Die orientation dot
Gate solder bar is under this corner

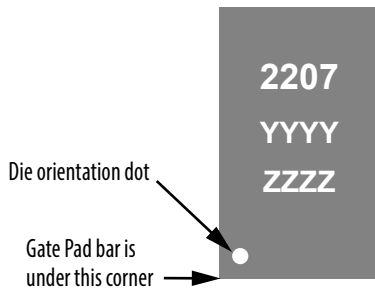
Die is placed into pocket solder bar side down (face side down)

EPC2207 (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
h	1.00	1.00	1.25

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.

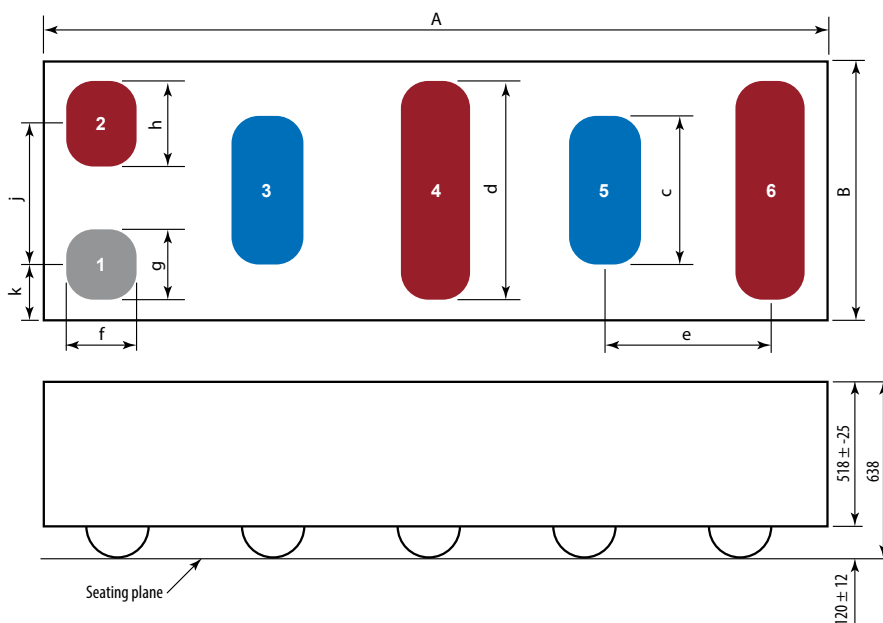
DIE MARKINGS



Part Number	Laser Markings		
	Part # Marking Line 1	Lot_Date Code Marking Line 2	Lot_Date Code Marking Line 3
EPC2207	2207	YYYY	ZZZZ

DIE OUTLINE

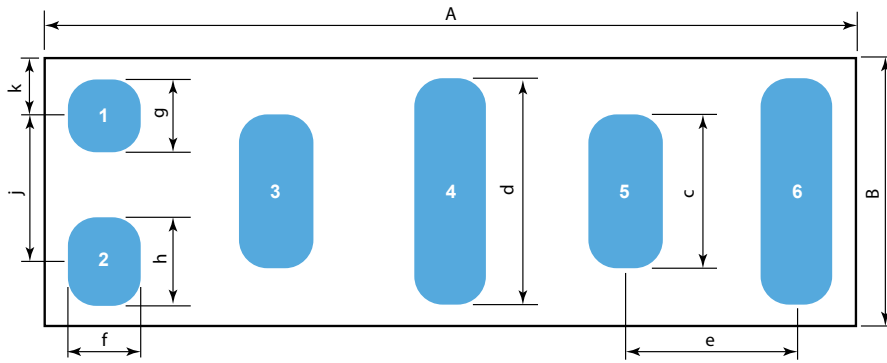
Solder Bump View



DIM	Micrometers		
	MIN	Nominal	MAX
A	2770	2800	2830
B	895	925	955
c		535	
d		775	
e		600	
f		250	
g		250	
h		300	
j		500	
k		200	

Pad 1 is Gate;
Pads 2, 4, 6 are Source;
Pads 3, 5 are Drain

RECOMMENDED LAND PATTERN
(units in μm)

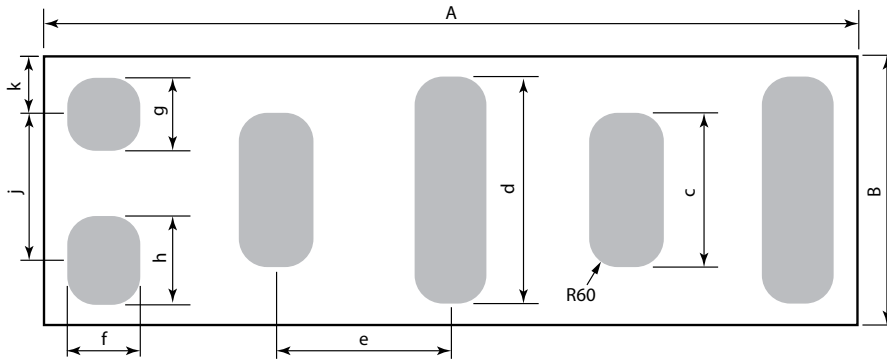


Land pattern is solder mask defined

DIM	Nominal
A	2800
B	925
c	535
d	775
e	600
f	250
g	250
h	300
j	500
k	200

Pad 1 is Gate;
Pads 2, 4, 6 are Source;
Pads 3, 5 are Drain

RECOMMENDED STENCIL DRAWING
(units in μm)



DIM	Nominal
A	2800
B	925
c	535
d	775
e	600
f	250
g	250
h	300
j	500
k	200

Recommended stencil should be 4 mil (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/DesignSupport/AssemblyBasics.aspx>

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Revised July, 2022