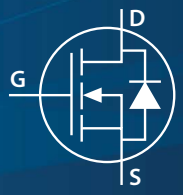
EPC2215 – Enhancement Mode Power Transistor

V_{DS}, 200 V

$R_{DS(on)}$, 8 mΩ

I_D, 32 A



EFFICIENT POWER CONVERSION

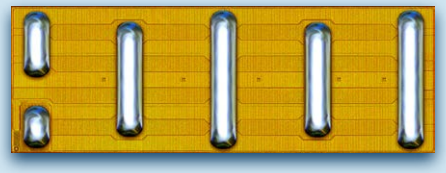
RoHS Halogen-Free

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)	32	A
	Pulsed (25°C, T_{PULSE} = 300 µs)	162	
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
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.5	°C/W
$R_{\theta JB}$	Thermal Resistance, Junction-to-Board	2.5	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	52	

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.



EPC2215 eGaN® FETs are supplied only in passivated die form with solder bars. Die Size: 4.6 mm x 1.6 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°C unless otherwise stated)						
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-to-Source Voltage	V_{GS} = 0 V, I_D = 0.6 mA	200			V
I_{DSS}	Drain-Source Leakage	V_{GS} = 0 V, V_{DS} = 160 V		0.15	0.48	mA
I_{GSS}	Gate-to-Source Forward Leakage	V_{GS} = 5 V		0.03	3.8	
	Gate-to-Source Forward Leakage#	V_{GS} = 5 V, T_J = 125°C		0.5	8.7	
	Gate-to-Source Reverse Leakage	V_{GS} = -4 V		0.15	0.48	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 6 mA	0.8	1.1	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	V_{GS} = 5 V, I_D = 20 A		6	8	mΩ
V_{SD}	Source-Drain Forward Voltage	I_S = 0.5 A, V_{GS} = 0 V		1.6		V

Defined by design. Not subject to production test.

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		1356	1790	pF
C_{RSS}	Reverse Transfer Capacitance			2.0		
C_{OSS}	Output Capacitance#			390	585	
$C_{OSS(ER)}$	Effective Output Capacitance, Energy Related (Note 2)	V_{DS} = 0 to 100 V, V_{GS} = 0 V		556		
$C_{OSS(TR)}$	Effective Output Capacitance, Time Related (Note 3)			699		
R_G	Gate Resistance			0.4		Ω
Q_G	Total Gate Charge#	V_{DS} = 100 V, V_{GS} = 5 V, I_D = 20 A		13.6	17.7	nC
Q_{GS}	Gate-to-Source Charge	V_{DS} = 100 V, I_D = 20 A		3.3		
Q_{GD}	Gate-to-Drain Charge			2.1		
$Q_{G(TH)}$	Gate Charge at Threshold			2.4		
Q_{OSS}	Output Charge#	V_{DS} = 100 V, V_{GS} = 0 V		69	104	
Q_{RR}	Source-Drain Recovery Charge			0		

Defined by design. Not subject to production test.
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

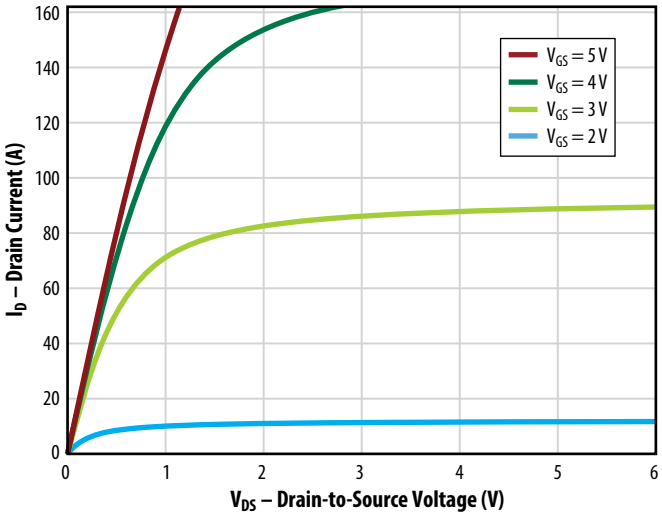


Figure 2: Transfer Characteristics

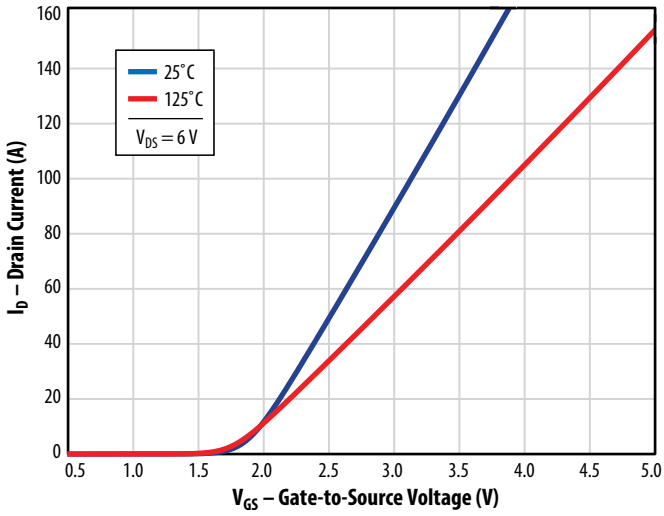


Figure 3: $R_{DS(on)}$ vs. V_{GS} for Various Drain Currents

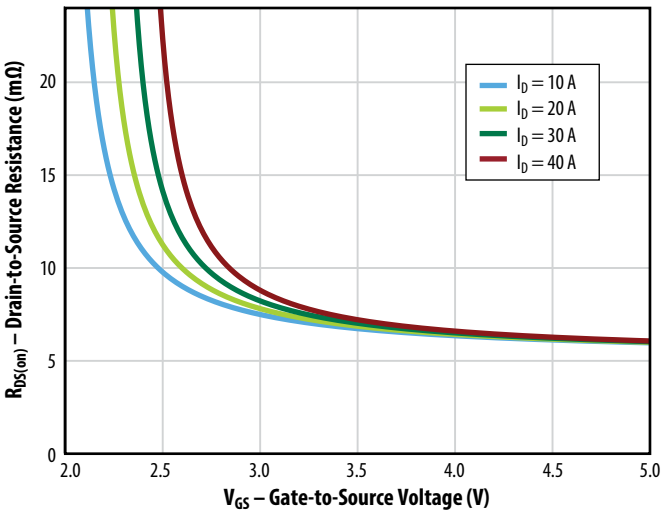


Figure 4: $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

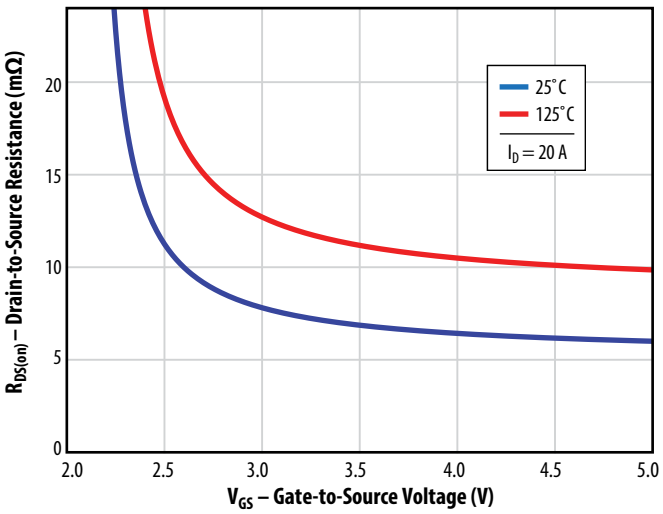


Figure 5a: Capacitance (Linear Scale)

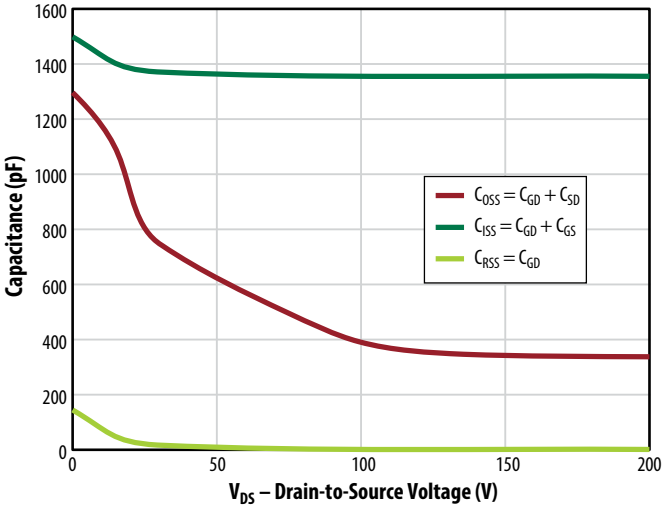


Figure 5b: Capacitance (Log Scale)

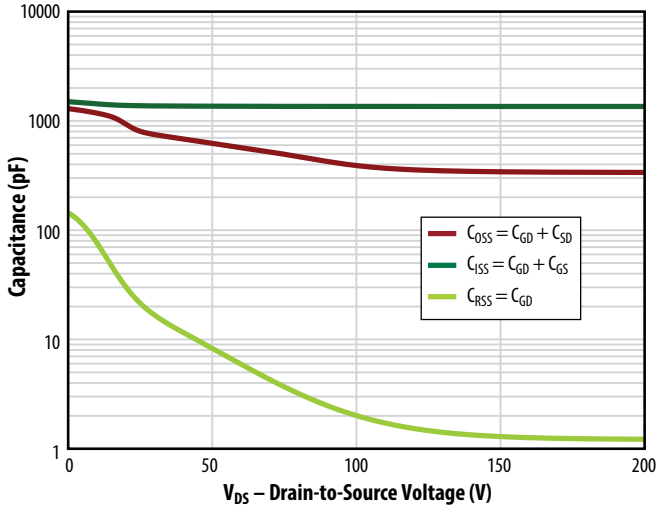


Figure 6: Output Charge and C_{OSS} Stored Energy

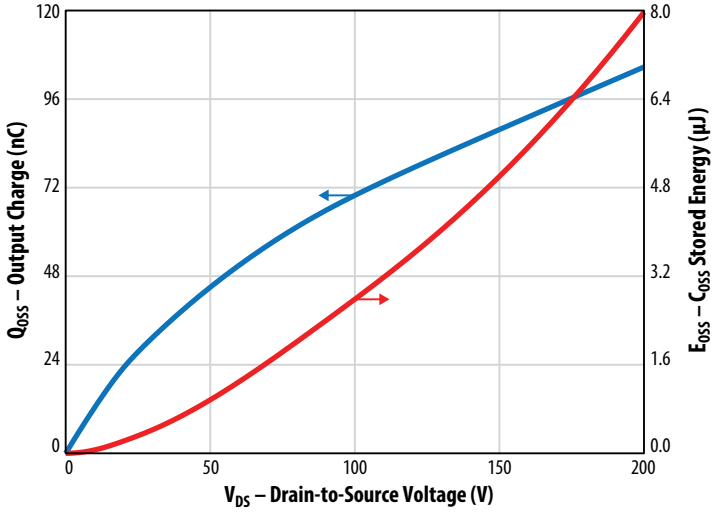


Figure 7: Gate Charge

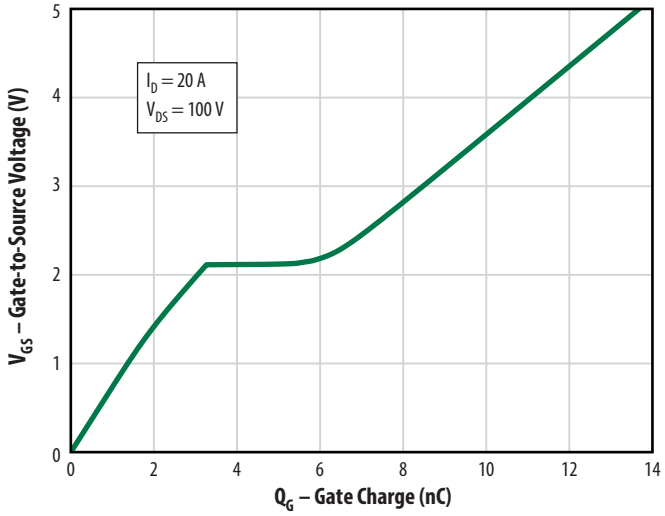


Figure 8: Reverse Drain-Source Characteristics

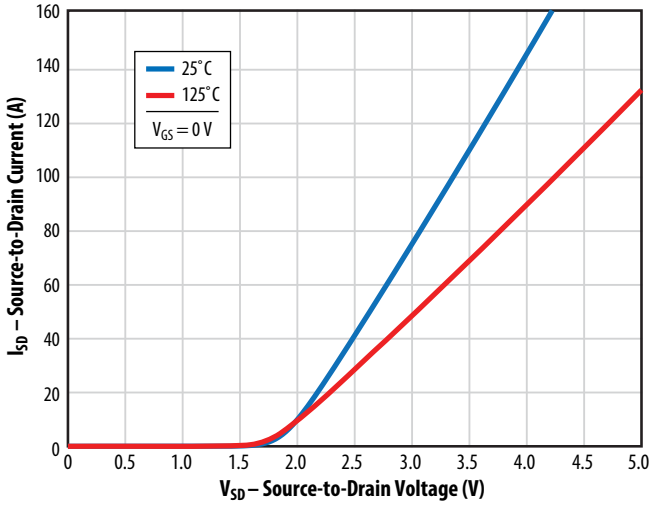


Figure 9: Normalized On-State Resistance vs. Temperature

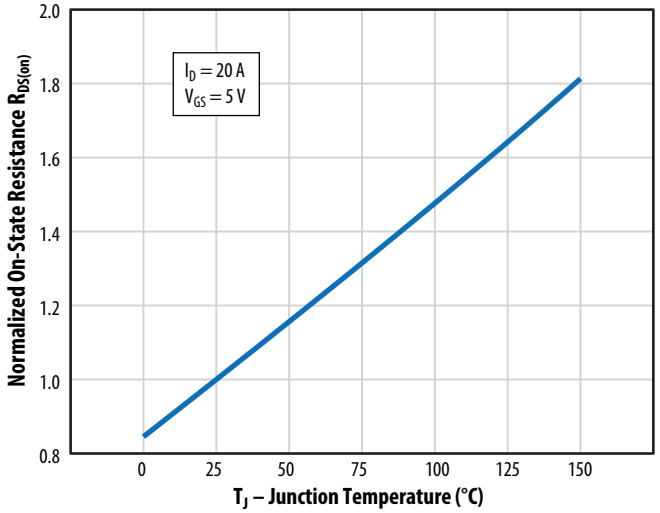


Figure 10: Normalized Threshold Voltage vs. Temperature

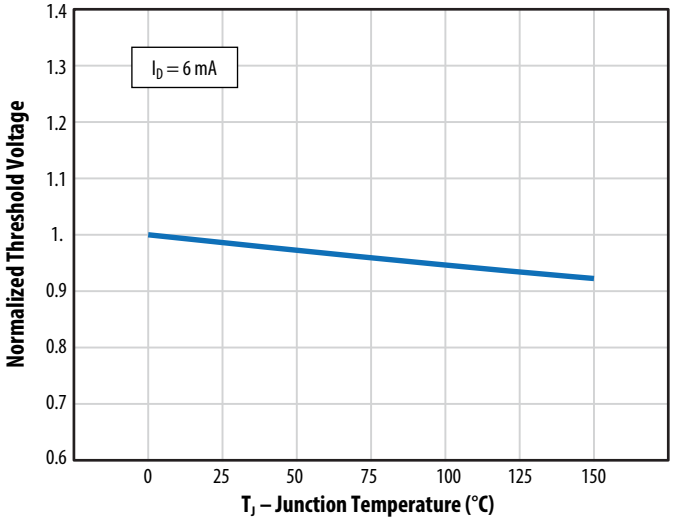
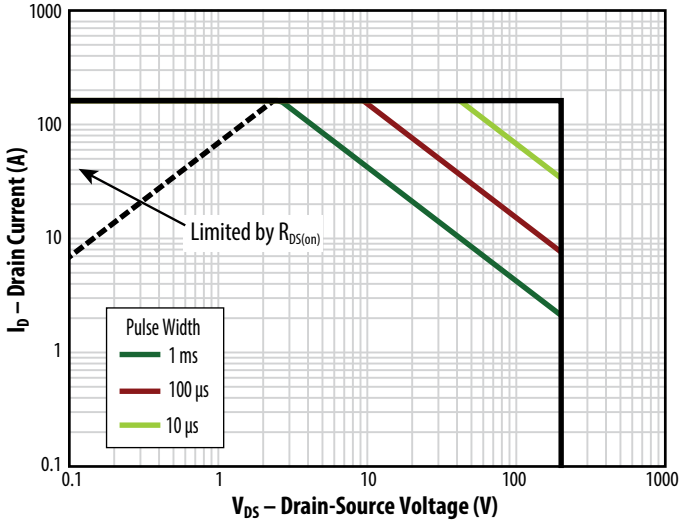


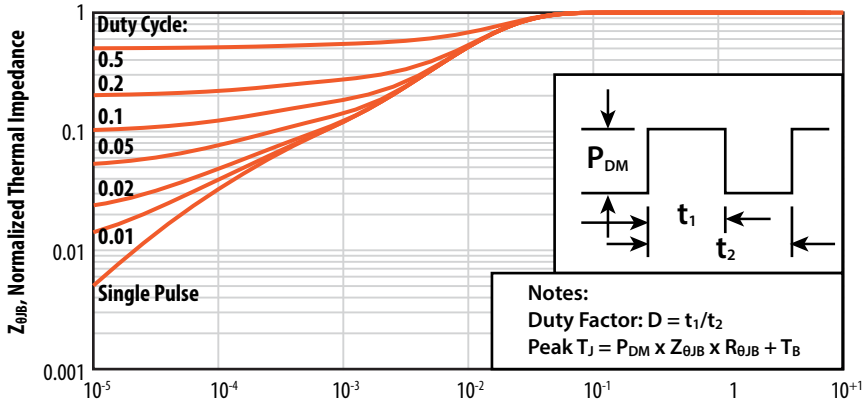
Figure 11: Safe Operating Area



T_J = Max Rated, T_C = +25°C, Single Pulse

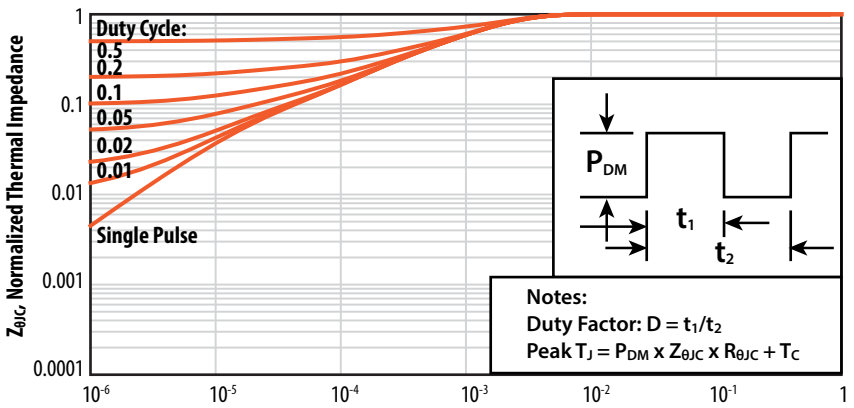
Figure 12: Transient Thermal Response Curves

Junction-to-Board



t_p, Rectangular Pulse Duration, seconds

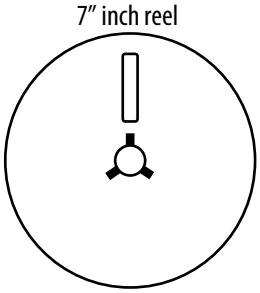
Junction-to-Case

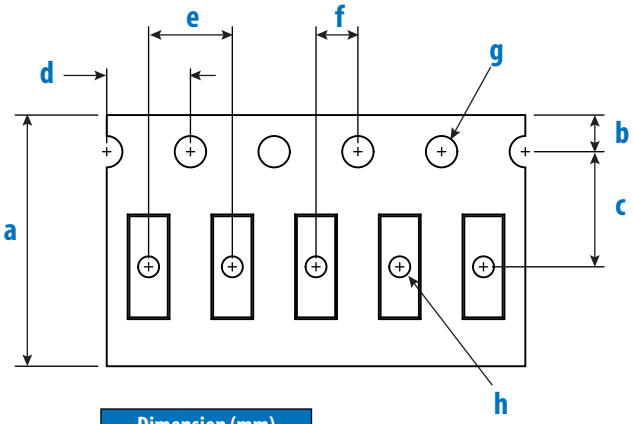


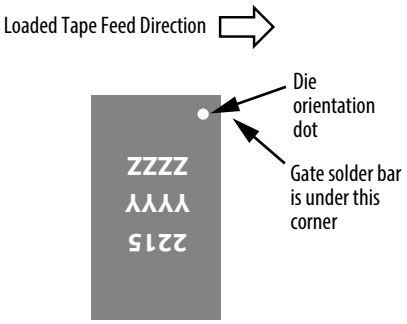
t_p, Rectangular Pulse Duration, seconds

TAPE AND REEL CONFIGURATION

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







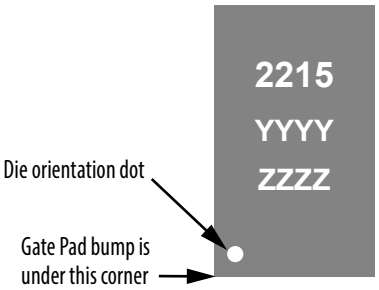
Die is placed into pocket solder bump side down (face side down)

	Dimension (mm)		
EPC2215 (Note 1)	Target	MIN	MAX
a	12.00	11.90	12.30
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	1.50	1.50	1.60
h	1.50	0.95	1.05

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.

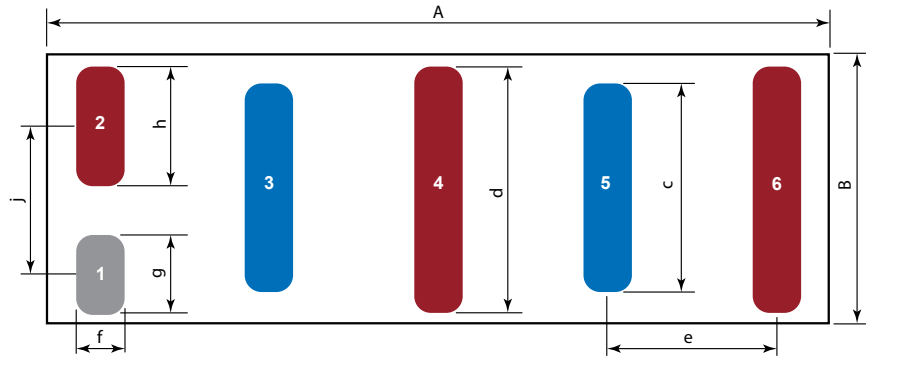
DIE MARKINGS



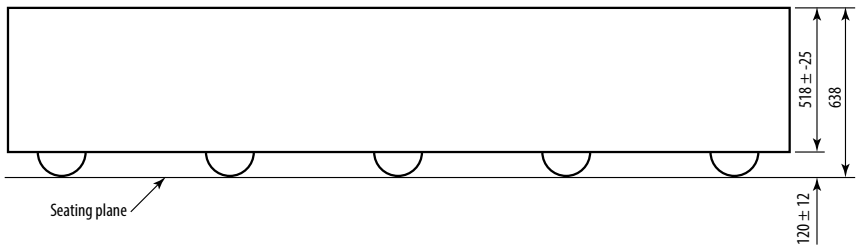
Part Number	Laser Markings		
	Part # Marking Line 1	Lot_Date Code Marking Line 2	Lot_Date Code Marking Line 3
EPC2215	2215	YYYY	ZZZZ

DIE OUTLINE

Solder Bump View



Side View



DIM	Micrometers		
	MIN	Nominal	MAX
A	4570	4600	4630
B	1570	1600	1630
c		1210	
d		1450	
e		1000	
f		275	
g		450	
h		700	
j		875	

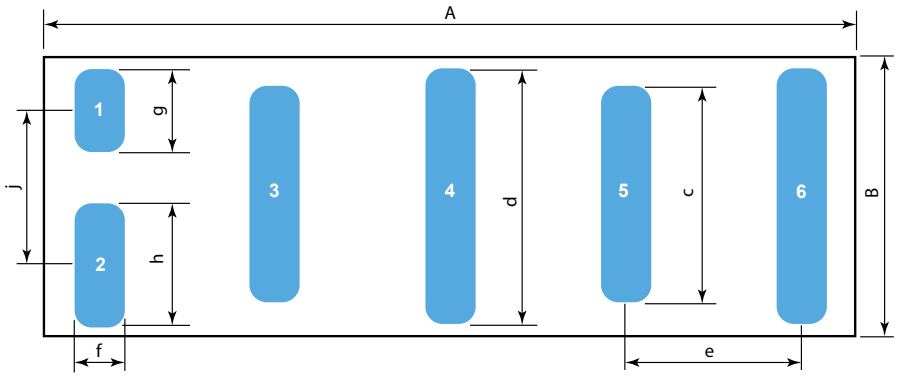
Pad 1 is Gate;

Pads 2 ,4, 6 are Source;

Pads 3, 5 are Drain

RECOMMENDED LAND PATTERN

(units in µm)



Land pattern is solder mask defined

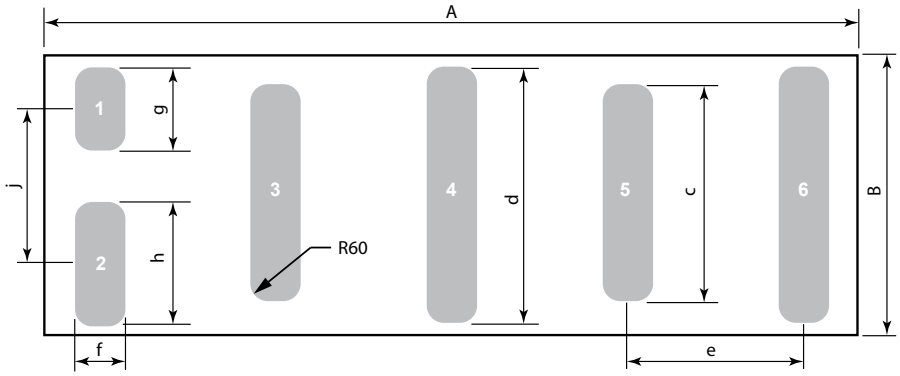
It is recommended to have on-Cu trace PCB vias

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

DIM	Nominal
A	4600
B	1600
c	1210
d	1450
e	1000
f	275
g	450
h	700
j	875

RECOMMENDED STENCIL DRAWING

(units in µm)



DIM	Nominal
A	4600
B	1600
c	1210
d	1450
e	1000
f	275
g	450
h	700
j	875

Recommended stencil should be 4 mil (100 µm) thick, must be laser cut, openings per drawing.

The corner has a radius of R60.

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

Split stencil design can be provided upon request, but EPC has tested this stencil design and not found any scooping issues.

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