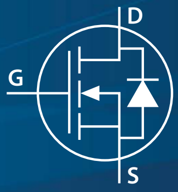
EPC2252 – Enhancement Mode Power Transistor

V_{DS} , 80 V
$R_{DS(on)}$, 11 mΩ max
I_D , 8.2 A
AEC-Q101



EFFICIENT POWER CONVERSION

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.

Application Notes:

- Easy-to-use and reliable gate, Gate Drive ON = 5 V typical, OFF = 0 V (negative voltage not needed)
- Top of FET is electrically connected to source

Questions:

ASK AN EXPERT GaN

Maximum Ratings

PARAMETER		VALUE	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	80	V
	Drain-to-Source Voltage (up to 10,000 5 ms pulses at 150°C)	96	
I_D	Continuous (T_A = 25°C)	8.2	A
	Pulsed (25°C, T_{PULSE} = 300 µs)	75	
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	

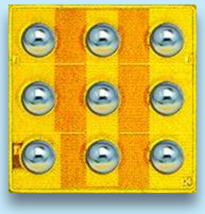
Thermal Characteristics

PARAMETER		TYP	UNIT
$R_{θJC}$	Thermal Resistance, Junction-to-Case (Case Top)	1.6	°C/W
$R_{θJB}$	Thermal Resistance, Junction-to-Board (Case Bottom)	8.3	
$R_{θJA\_JEDEC}$	Thermal Resistance, Junction-to-Ambient (using JEDEC 51-2 PCB)	95	
$R_{θJA\_EVB}$	Thermal Resistance, Junction to Ambient (using EPC9093 EVB)	71	

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 = 0.12 mA	80			V
I_{DSS}	Drain-Source Leakage	V_{DS} = 80 V, V_{GS} = 0 V		25	120	µA
I_{GSS}	Gate-to-Source Forward Leakage	V_{GS} = 6 V		0.02	1.4	mA
	Gate-to-Source Forward Leakage#	V_{GS} = 6 V, T_J = 125°C		0.3	5.0	
	Gate-to-Source Reverse Leakage	V_{GS} = -4 V		0.02	0.125	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 2.5 mA	0.7	1.2	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	V_{GS} = 5 V, I_D = 11 A		8	11	mΩ
V_{SD}	Source-Drain Forward Voltage#	I_S = 0.5 A, V_{GS} = 0 V		1.5		V

Defined by design. Not subject to production test.



Die size: 1.5 x 1.5 mm

EPC2252 eGaN® FETs are supplied in passivated die form with solder bumps.

Applications

- Automotive Lidar/TOF
- 48 V Servers
- Pulsed Power
- Isolated Power Supplies
- Point of Load Converters
- Class D Audio
- LED Lighting
- Low Inductance Motor Drive

Benefits

- Higher Switching Frequency – Lower switching losses and lower drive power
- Higher Efficiency – Lower conduction and switching losses, zero reverse recovery losses
- Ultra Small Footprint – Higher power density

Scan QR code or click link below for more information including reliability reports, device models, demo boards!

https://l.ead.me/EPC2252

Dynamic Characteristics# (T_J = 25°C unless otherwise stated)						
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
C_{ISS}	Input Capacitance	V_{DS} = 50 V , V_{GS} = 0 V		440	576	pF
C_{RSS}	Reverse Transfer Capacitance			1.3		
C_{OSS}	Output Capacitance			190	204	
$C_{OSS(ER)}$	Effective Output Capacitance, Energy Related (Note 1)	V_{DS} = 0 to 50 V, V_{GS} = 0 V		233		
$C_{OSS(TR)}$	Effective Output Capacitance, Time Related (Note 2)			305		
R_G	Gate Resistance			0.6		Ω
Q_G	Total Gate Charge	V_{DS} = 50 V, V_{GS} = 5 V, I_D = 11 A		3.5	4.3	nC
Q_{GS}	Gate-to-Source Charge	V_{DS} = 50 V, I_D = 11 A		1.0		
Q_{GD}	Gate-to-Drain Charge			0.5		
$Q_{G(TH)}$	Gate Charge at Threshold			0.7		
Q_{OSS}	Output Charge	V_{DS} = 50 V , V_{GS} = 0 V		15	17	
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 1: $C_{OSS(ER)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 50 V.
Note 2: $C_{OSS(TR)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 50 V.

Figure 1: Typical Output Characteristics at 25°C

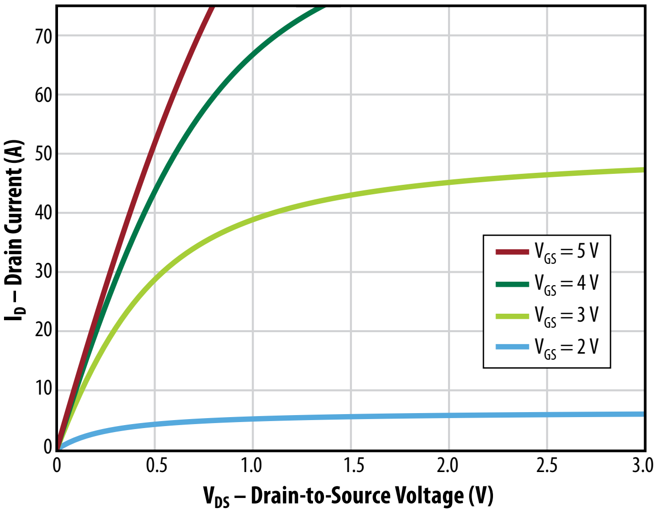


Figure 2: Typical Transfer Characteristics

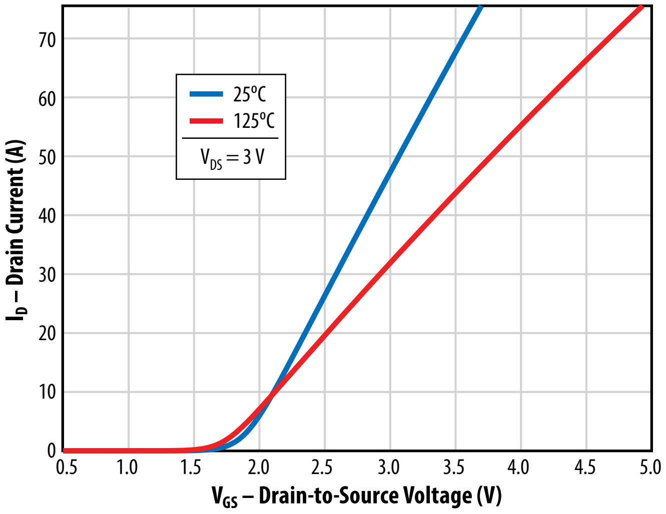


Figure 3: $R_{DS(on)}$ vs. V_{GS} for Various Currents

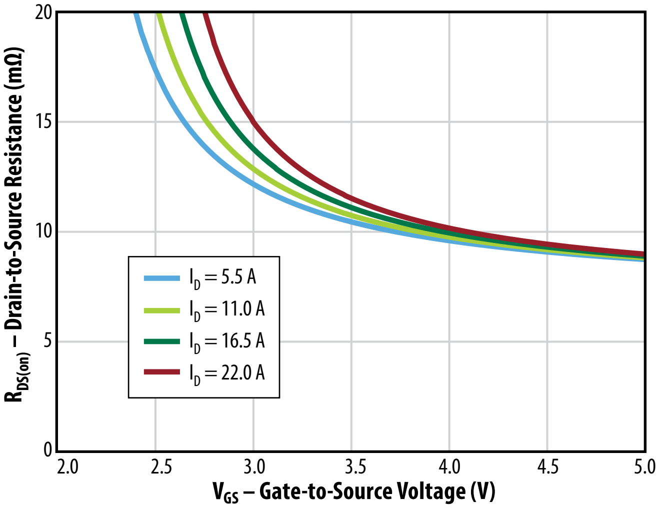


Figure 4: $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

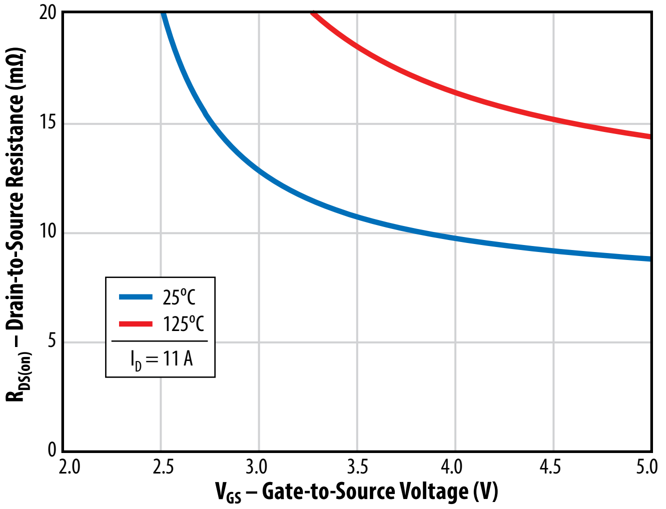


Figure 5a: Typical Capacitance (Linear Scale)

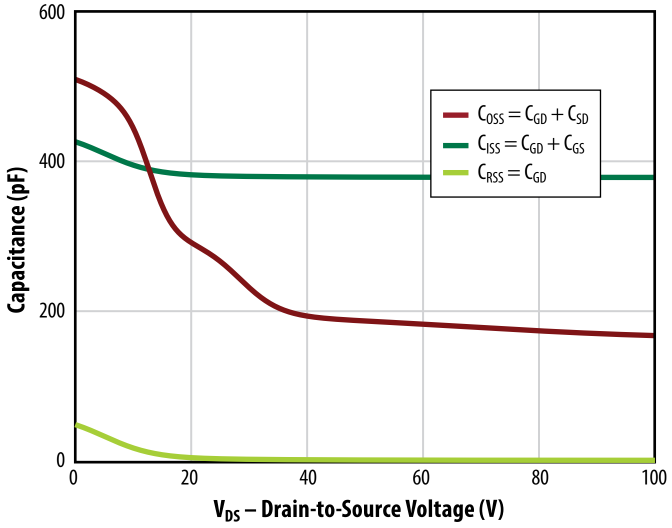


Figure 5b: Typical Capacitance (Log Scale)

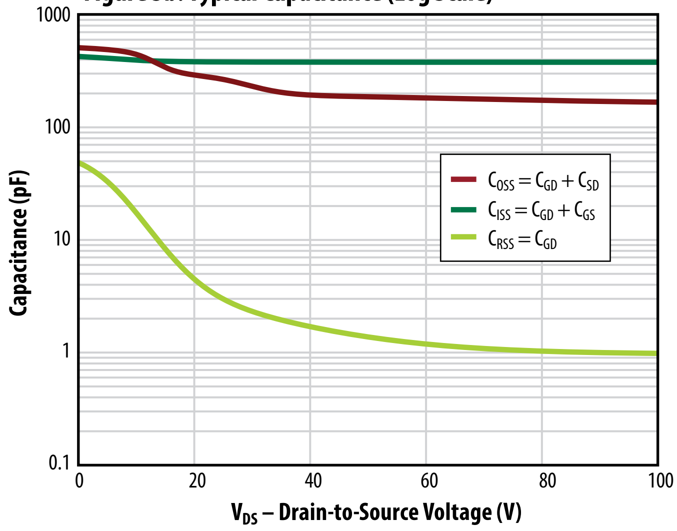


Figure 6: Typical Output Charge and C_{OSS} Stored Energy

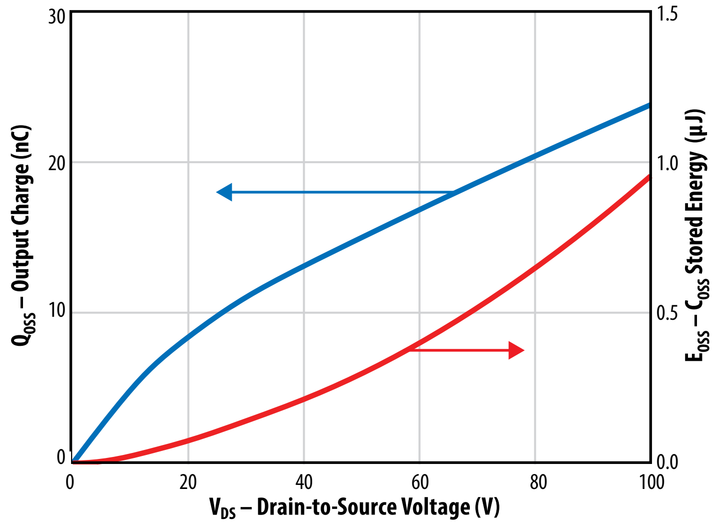


Figure 7: Typical Gate Charge

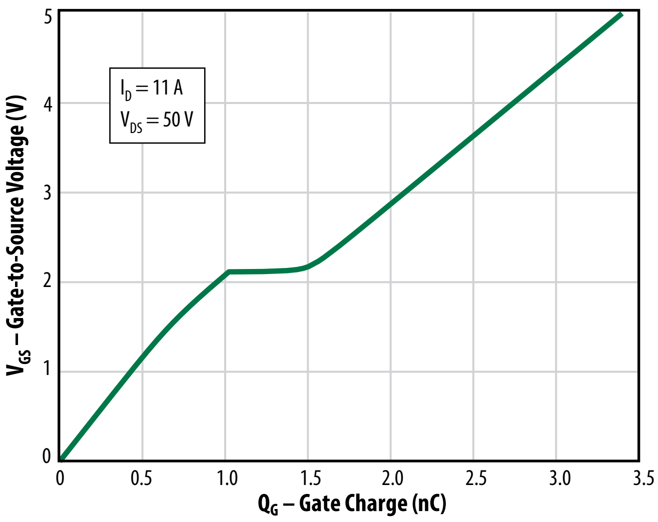


Figure 8: Reverse Drain-Source Characteristics

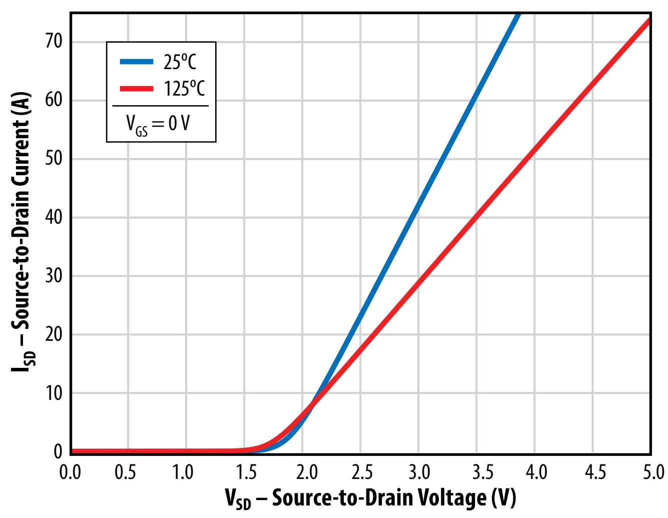
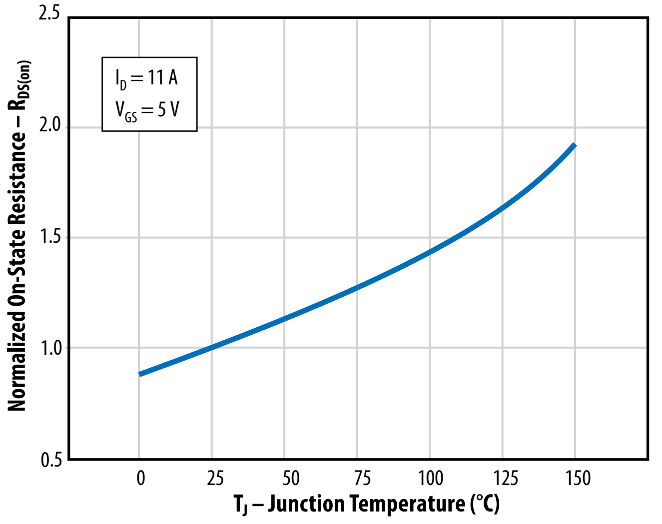


Figure 9: Normalized On-State Resistance vs. Temperature



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

Figure 10: Normalized Threshold Voltage vs. Temperature

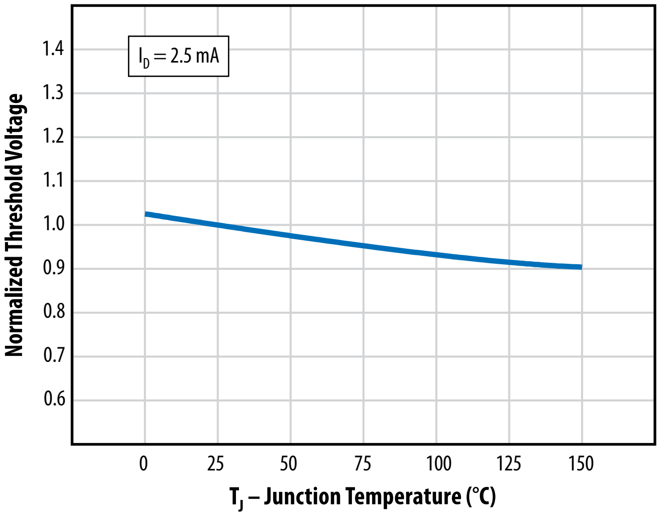
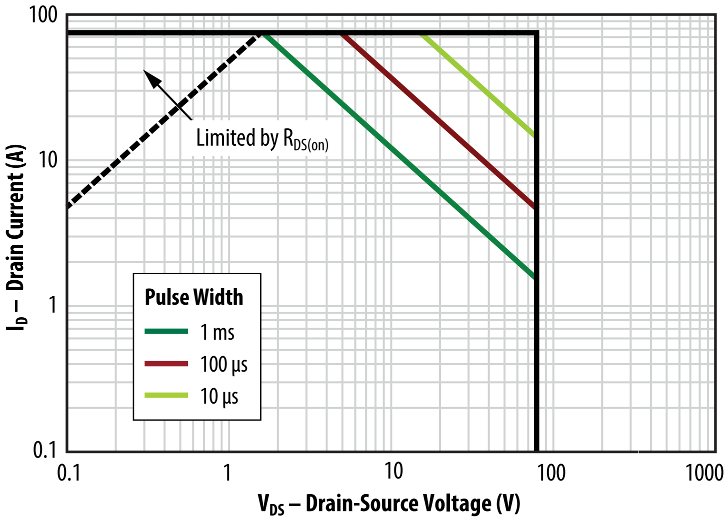


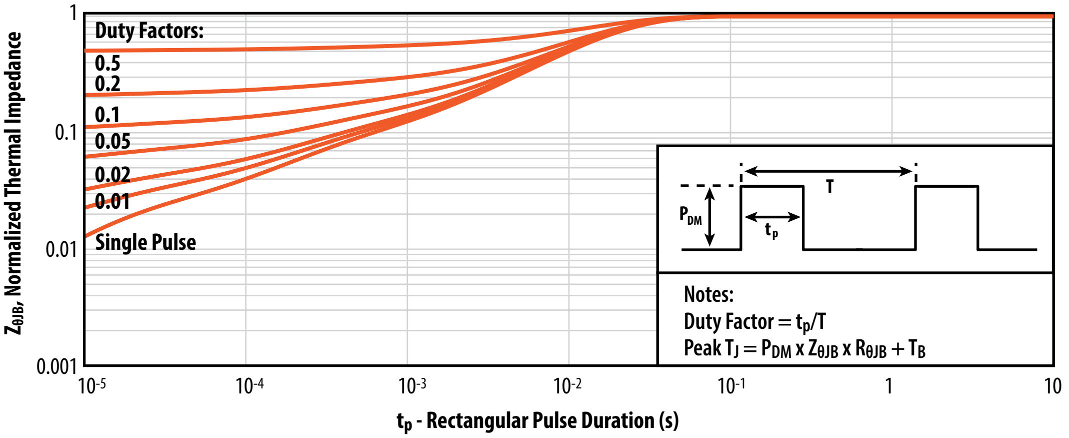
Figure 11: Normalized Threshold Voltage vs. Temperature



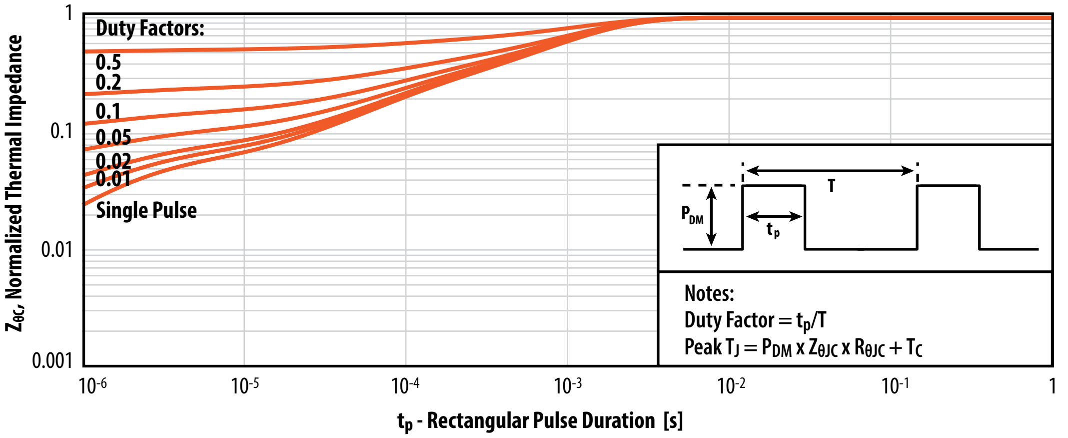
T_J = Max Rated, T_C = +25°C, Single Pulse

Figure 12: Transient Thermal Response Curves

Junction-to-Board

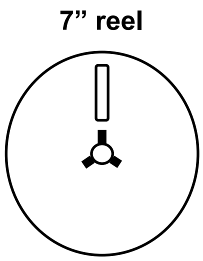


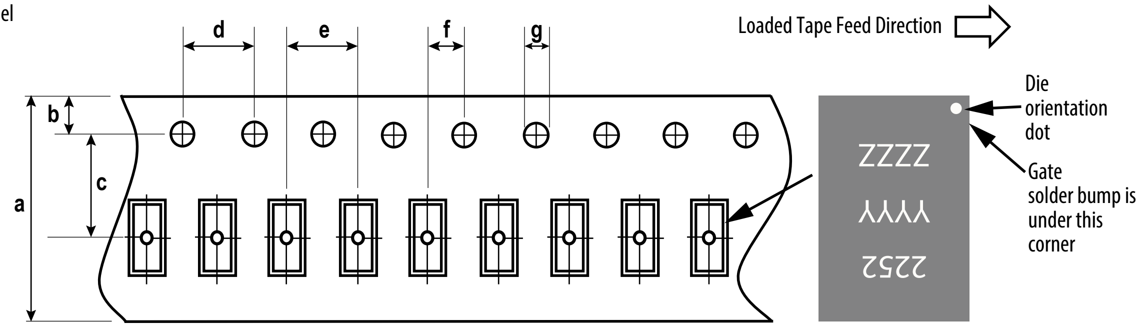
Junction-to-Case



TAPE AND REEL CONFIGURATION

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





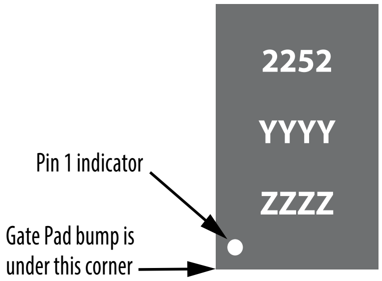
Die is placed into pocket solder bump side down (face side down)

	Dimension (mm)		
EPC2252 (Note 1)	**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

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.

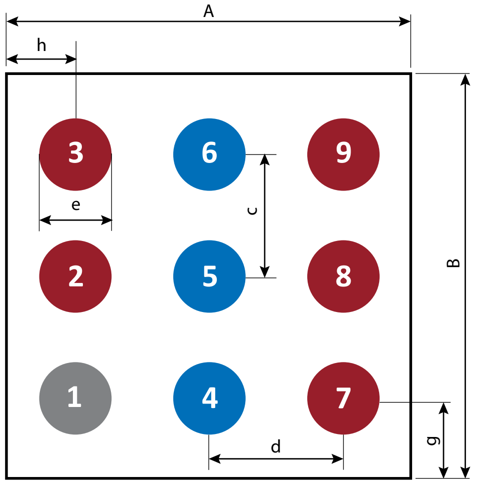
DIE MARKINGS



Part Number	Laser Markings		
	Part # Marking Line 1	**Lot_Date Code Marking Line 2**	**Lot_Date Code Marking Line 3**
EPC2252	2252	YYYY	ZZZZ

DIE OUTLINE

Solder Bump View



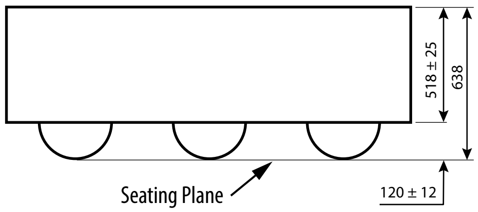
DIM	MICROMETERS		
	MIN	**Nominal**	**MAX**
A	1470	1500	1530
B	1470	1500	1530
c		450	
d		500	
e		250	
g		300	
h		250	

Pad 1 is Gate;

Pads 2, 3, 7, 8, 9 are Source;

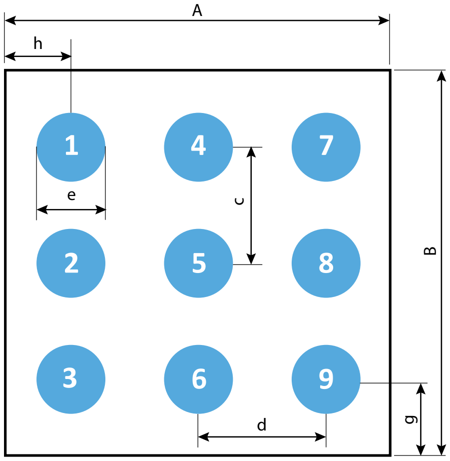
Pads 4, 5, 6 are Drain

Side View



RECOMMENDED LAND PATTERN

(units in µm)



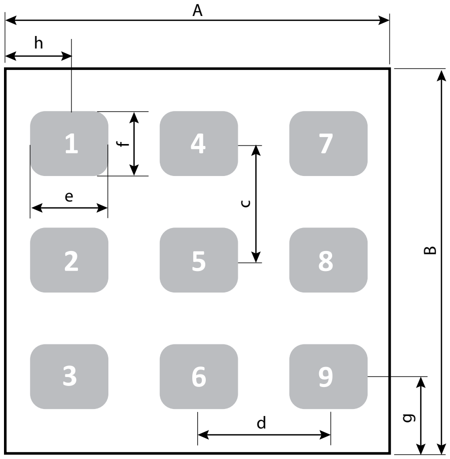
Land pattern is solder mask defined

DIM	MICROMETERS
A	1500
B	1500
c	450
d	500
e	230
g	300
h	250

Pad 1 is Gate;
Pads 2, 3, 7, 8, 9 are Source;
Pads 4, 5, 6 are Drain

RECOMMENDED STENCIL DRAWING

(measurements in µm)



DIM	MICROMETERS
A	1500
B	1500
c	450
d	500
e	300
f	250
g	300
h	250

Pad 1 is Gate;
Pads 2, 3, 7, 8, 9 are Source;
Pads 4, 5, 6 are Drain

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 4 solder, reference 88.5% metals content.

Additional resources available:

- Assembly resources – **https://epc-co.com/epc/Portals/0/epc/documents/product-training/Appnote_GaNassembly.pdf**
- Library of Altium footprints for production FETs and ICs – **https://epc-co.com/epc/documents/altium-files/EPC%20Altium%20Library.zip** (for preliminary device Altium footprints, contact EPC)

Information subject to
change without notice.
Revised January 2023