

EPC2088 – Enhancement Mode Power Transistor

 $V_{DS}, 100\text{ V}$
 $R_{DS(on)}, 3.2\text{ m}\Omega\text{ max}$
 $I_D, 60\text{ A}$


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.

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 a GaN Expert](#)

Questions:



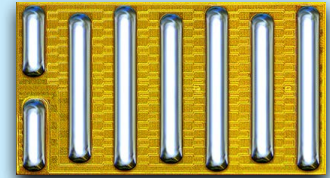
Maximum Ratings			
PARAMETER		VALUE	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	100	V
	Drain-to-Source Voltage (up to 10,000 5 ms pulses at 150 °C)	120	
I_D	Continuous ($T_A = 25^\circ\text{C}$)	60	A
	Pulsed (25°C , $T_{PULSE} = 300\text{ }\mu\text{s}$)	231	
V_{GS}	Gate-to-Source Voltage	6	V
	Gate-to-Source 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	0.5	$^\circ\text{C/W}$
$R_{\theta JB}$	Thermal Resistance, Junction-to-Board	1.4	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	53	

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.

Static Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise stated)						
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-to-Source Voltage	$V_{GS} = 0\text{ V}$, $I_D = 0.1\text{ mA}$	100			V
I_{DSS}	Drain-Source Leakage	$V_{GS} = 0\text{ V}$, $V_{DS} = 80\text{ V}$		0.002	0.08	mA
I_{GSS}	Gate-to-Source Forward Leakage	$V_{GS} = 5\text{ V}$		0.007	2.3	
	Gate-to-Source Forward Leakage [#]	$V_{GS} = 5\text{ V}$, $T_J = 125^\circ\text{C}$		1	9	
	Gate-to-Source Reverse Leakage	$V_{GS} = -4\text{ V}$		0.01	0.2	
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 7\text{ mA}$	0.7	1.3	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS} = 5\text{ V}$, $I_D = 25\text{ A}$		2.4	3.2	m Ω
V_{SD}	Source-Drain Forward Voltage [#]	$I_S = 0.5\text{ A}$, $V_{GS} = 0\text{ V}$		1.5		V

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



Die Size: 3.5 x 1.95 mm

EPC2088 eGaN® FETs are supplied only in passivated die form with solder bars.

Applications

- DC-DC Converters
- BLDC Motor Drives
- Sync Rectification for AC/DC and DC-DC
- Point-of-Load Converters
- USB-C
- Lidar
- Class-D Audio
- LED Lighting
- E-Mobility

Benefits

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

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



<https://l.ead.me/EPC2088>

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
C_{ISS}	Input Capacitance	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$		1864	2703	pF
C_{RSS}	Reverse Transfer Capacitance			3.6		
C_{OSS}	Output Capacitance			557	659	
$C_{OSS(ER)}$	Effective Output Capacitance, Energy Related (Note 2)	$V_{DS} = 0\text{ to }50\text{ V}, V_{GS} = 0\text{ V}$		694		
$C_{OSS(TR)}$	Effective Output Capacitance, Time Related (Note 3)			944		
R_G	Gate Resistance			0.4		Ω
Q_G	Total Gate Charge	$V_{DS} = 50\text{ V}, V_{GS} = 5\text{ V}, I_D = 25\text{ A}$		12.5	17.8	nC
Q_{GS}	Gate-to-Source Charge	$V_{DS} = 50\text{ V}, I_D = 25\text{ A}$		4.4		
Q_{GD}	Gate-to-Drain Charge			1.4		
$Q_{G(TH)}$	Gate Charge at Threshold			3.2		
Q_{OSS}	Output Charge	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$		47	55	
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} .

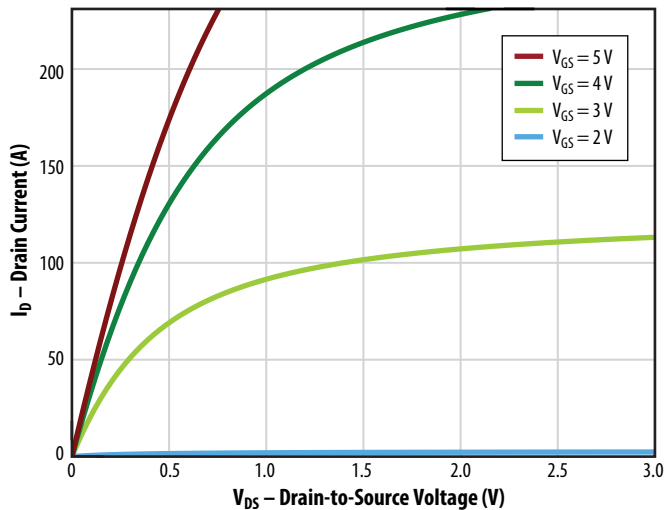
Figure 1: Typical Output Characteristics at 25°C 

Figure 2: Typical Transfer Characteristics

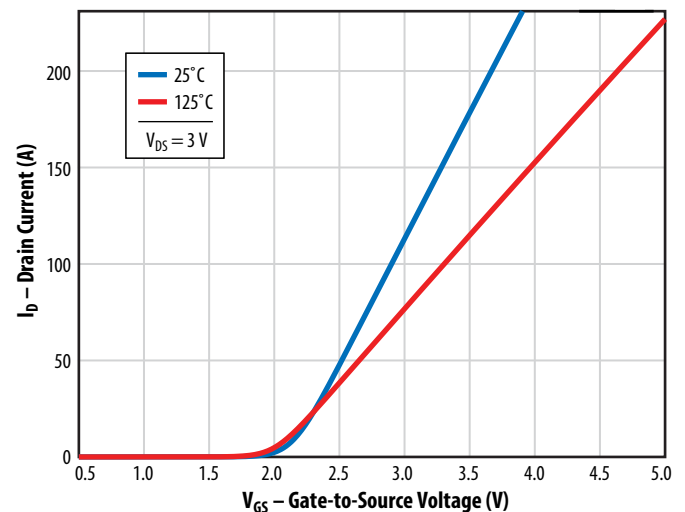
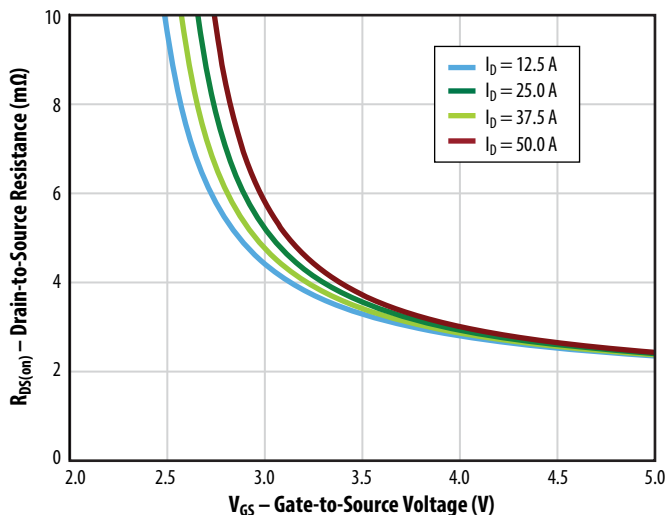
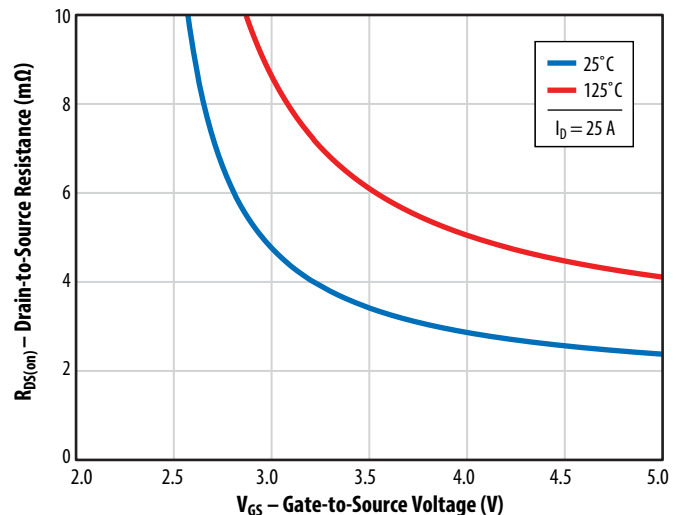
Figure 3: $R_{DS(on)}$ vs. V_{GS} for Various Drain CurrentsFigure 4: $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

Figure 5a: Typical Capacitance (Linear Scale)

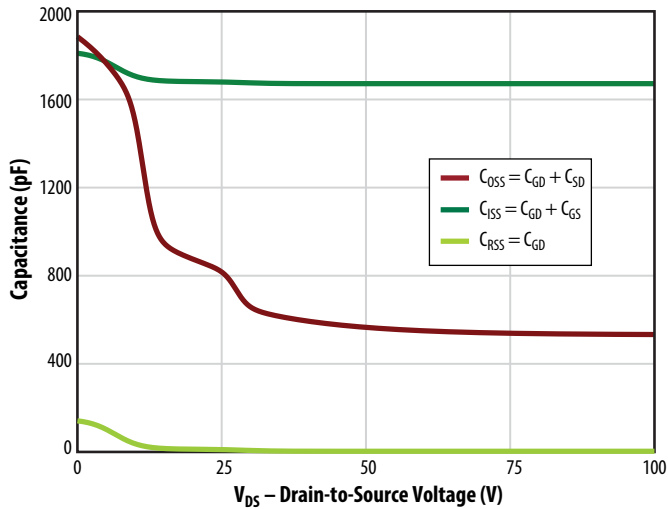


Figure 5b: Typical Capacitance (Log Scale)

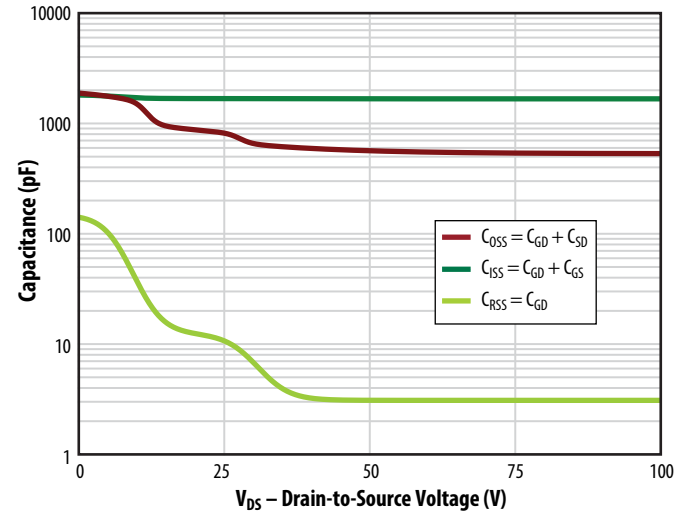
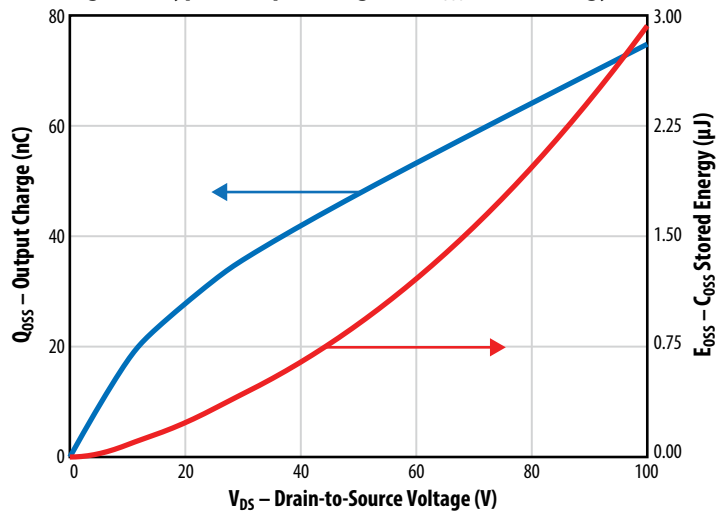
Figure 6: Typical Output Charge and C_{OSS} Stored Energy

Figure 7: Typical Gate Charge

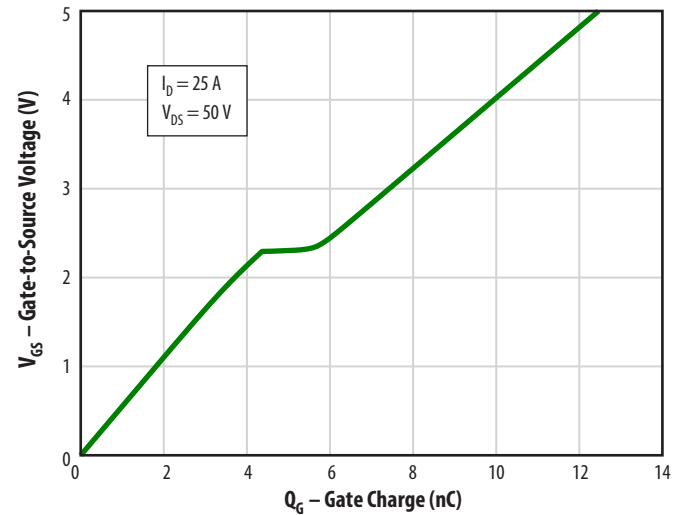


Figure 8: Reverse Drain-Source Characteristics

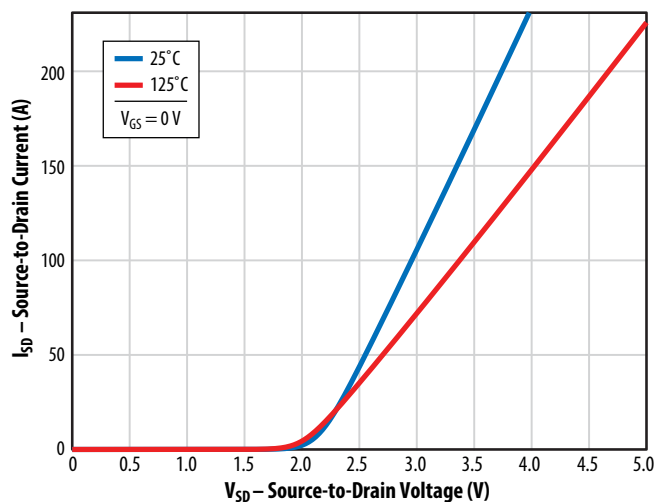
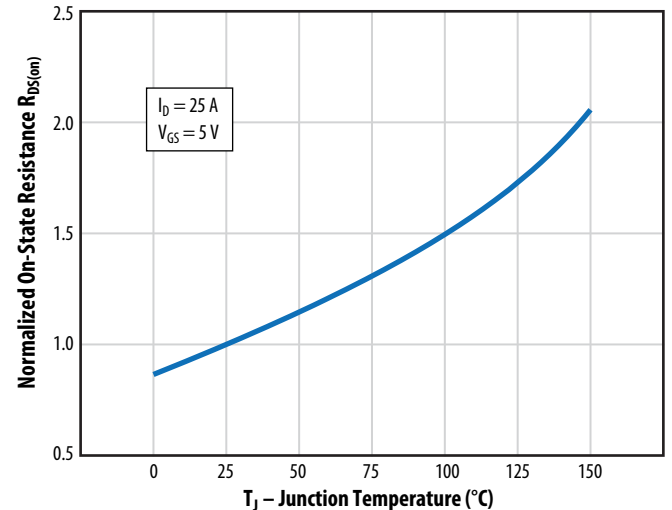


Figure 9: Normalized On-State Resistance vs. Temperature



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

Figure 10: Normalized Threshold Voltage vs. Temperature

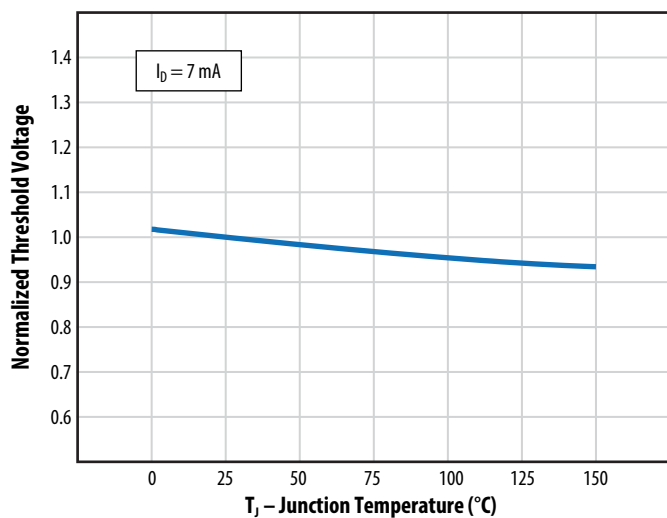


Figure 11: Safe Operating Area

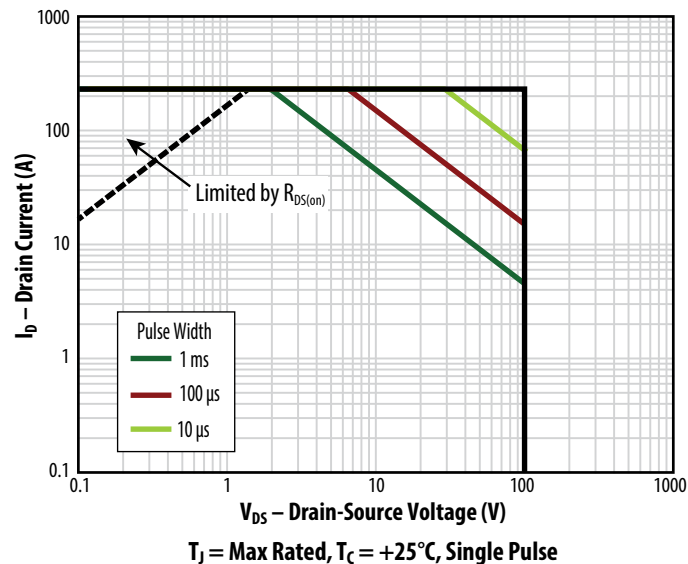
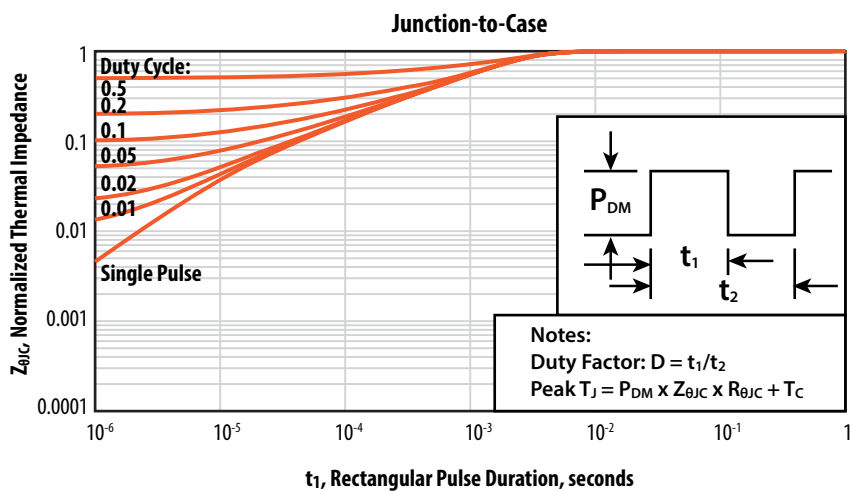
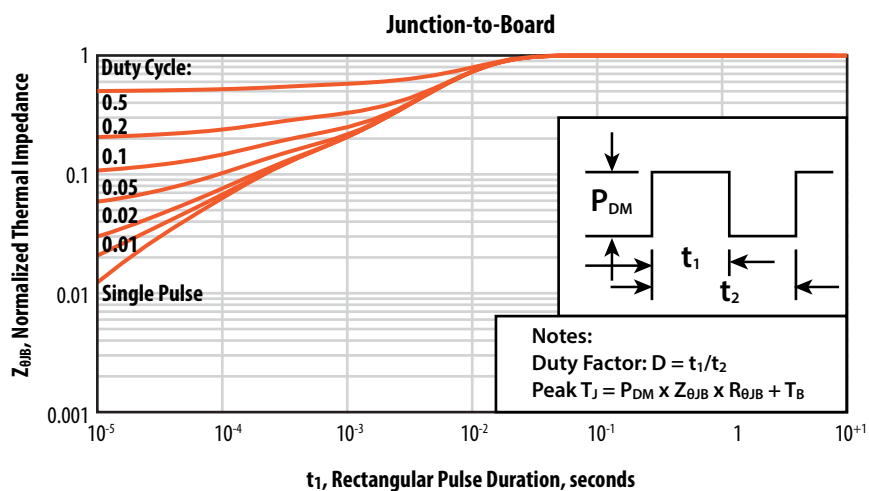
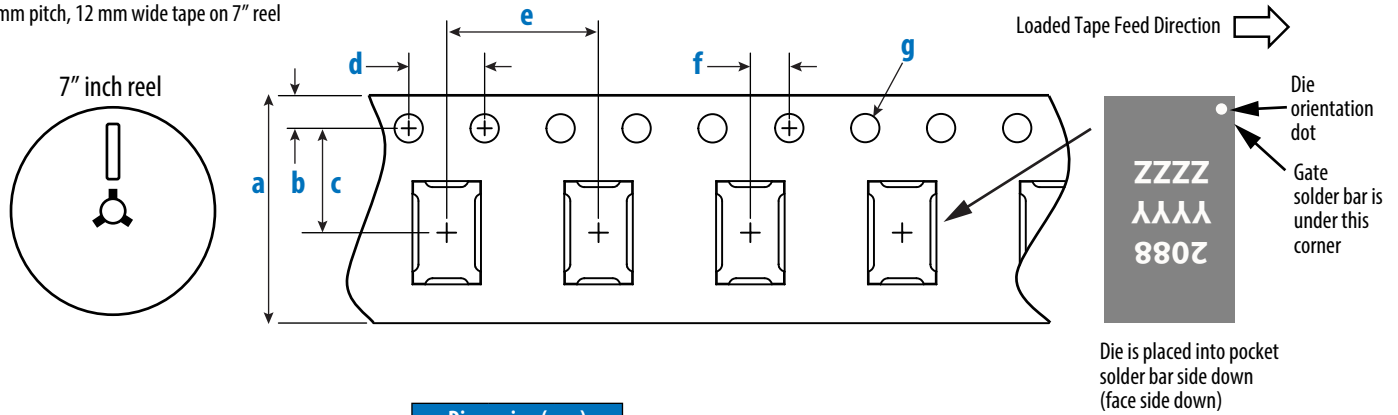


Figure 12: Transient Thermal Response Curves



TAPE AND REEL CONFIGURATION

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

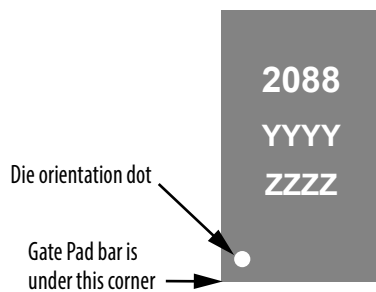


EPC2088 (Note 1)	Dimension (mm)		
	Target	MIN	MAX
a	12.00	11.90	12.30
b	1.75	1.65	1.85
c (Note 2)	5.50	5.45	5.55
d	4.00	3.90	4.10
e	8.00	7.90	8.10
f (Note 2)	2.00	1.95	2.05
g	1.50	1.50	1.60

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.

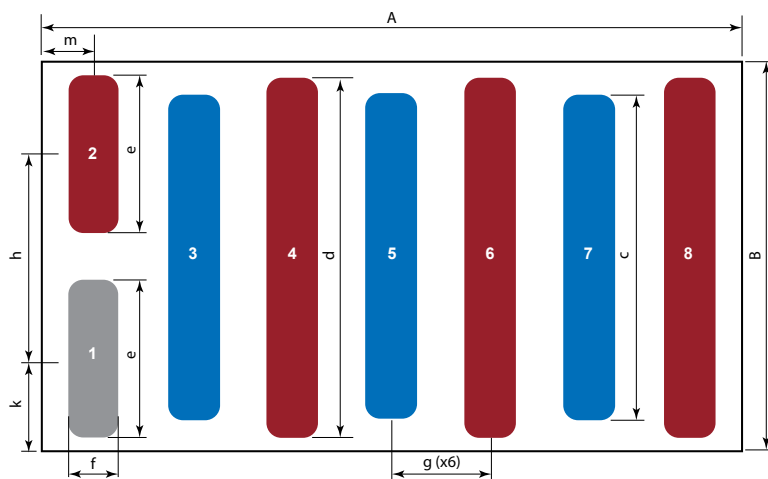
DIE MARKINGS



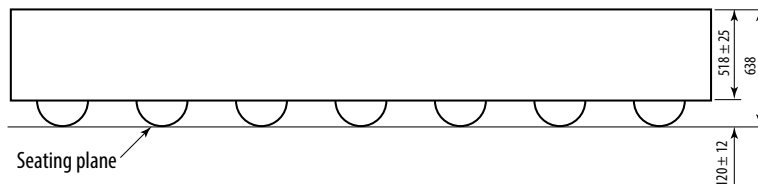
Part Number	Laser Markings		
	Part # Marking Line 1	Lot _Date Code Marking Line 2	Lot _Date Code Marking Line 3
EPC2088	2088	YYYY	ZZZZ

DIE OUTLINE

Solder Bump View



Side View



DIM	Micrometers		
	MIN	Nominal	MAX
A	3470	3500	3530
B	1920	1950	1980
C	1605	1625	1645
D	1780	1800	1820
E	755	775	795
F	230	250	270
G		500	
H		1025	
K		462.5	
M		250	

Pad 1 is Gate;

Pads 2, 4, 6, 8 are Source;

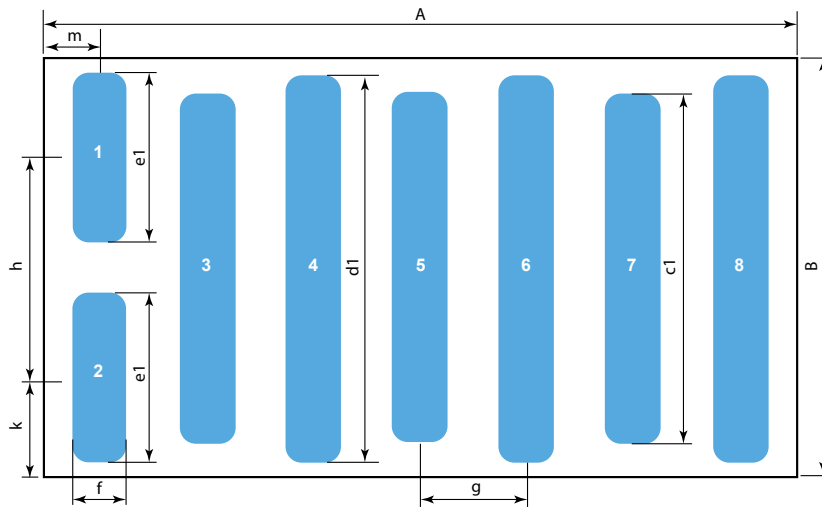
Pads 3, 5, 7 are Drain

Notes:

Substrate (top side) connected to Source.
Dimensions **d** and **c** are centered.

RECOMMENDED LAND PATTERN

(units in μm)



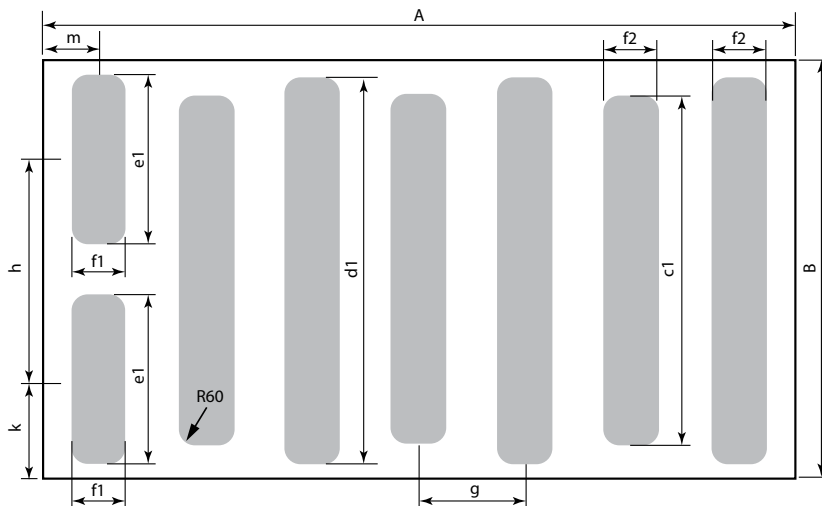
Land pattern is solder mask defined

DIM	Nominal
A	3500
B	1950
c1	1605
d1	1780
e1	755
f	230
g	500
h	1025
k	462.5
m	250

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

RECOMMENDED STENCIL DRAWING

(units in μm)



DIM	Nominal
A	3500
B	1950
c1	1605
d1	1780
e1	755
f1	230
f2	210
g	500
h	1025

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.

The corner has a radius of R60.

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

Additional Resources Available

- Assembly resources available at:

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)

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