Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

EPC2104 – Enhancement-Mode GaN Power Transistor Half-Bridge

V_{DS} , 100 V
$R_{DS(on)}$, 6.8 mΩ
I_D , 30 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.

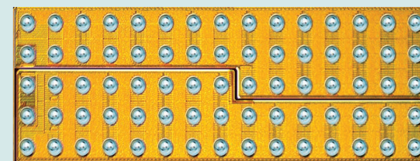
Maximum Ratings

DEVICE	PARAMETER		VALUE	UNIT
Q1 & Q2	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˚C, $R_{θJA}$ = 10°C/W)	30	A
		Pulsed (25°C, T_{PULSE} = 300 µs)	180	
	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
Q1 & Q2	$R_{θJC}$	Thermal Resistance, Junction to Case	0.3	°C/W
	$R_{θJB}$	Thermal Resistance, Junction to Board	2.2	
	$R_{θJA}$	Thermal Resistance, Junction to Ambient (Note 1)	42	

Note 1: $R_{θJA}$ is determined with the device mounted on one square inch of copper pad, single layer 2 oz copper on FR4 board.
See http://epc-co.com/epc/documents/product-training/Appnote_Thermal_Performance_of_eGaN_FETs.pdf for details



EPC2104 eGaN® ICs are supplied only in passivated die form with solder bumps
Die Size: 6.05 mm x 2.3 mm

Applications

- High Frequency DC-DC
- Motor Drive

Benefits

- Ultra High Efficiency
- High Frequency Operation
- High Density Footprint

www.epc-co.com/epc/Products/eGaNFETsandICs/EPC2104.aspx

Static Characteristics

DEVICE	PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Q1 & Q2	BV_{DSS}	Drain-to-Source Voltage	V_{GS} = 0 V, I_D = 0.5 mA	100			V
	I_{DSS}	Drain-Source Leakage	V_{DS} = 80 V, V_{GS} = 0 V		0.006	0.4	mA
	I_{GSS}	Gate-to-Source Forward Leakage	V_{GS} = 5 V		0.012	5.5	mA
		Gate-to-Source Reverse Leakage	V_{GS} = -4 V		0.006	0.4	mA
	$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 6 mA	0.8	1.3	2.5	V
	$R_{DS(on)}$	Drain-Source On Resistance	V_{GS} = 5 V, I_D = 20 A		5	6.8	mΩ
	V_{SD}	Source-Drain Forward Voltage	I_S = 0.5 A, V_{GS} = 0 V		1.9		V

Dynamic Characteristics							
DEVICE	PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Q1	C_{ISS}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V		730	880	pF
	C_{RSS}	Reverse Transfer Capacitance			5		
	C_{OSS}	Output Capacitance			430	645	
	$C_{OSS(ER)}$	Effective Output Capacitance, Energy Related (Note 2)	V_{DS} = 0 to 50 V, V_{GS} = 0 V		545		
	$C_{OSS(TR)}$	Effective Output Capacitance, Time Related (Note 3)			699		
	Q_G	Total Gate Charge	V_{DS} = 50 V, V_{GS} = 5 V, I_D = 20 A		6.8	8.7	nC
	Q_{GS}	Gate-to-Source Charge	V_{DS} = 50 V, I_D = 20 A		2.3		
	Q_{GD}	Gate-to-Drain Charge			1.4		
	$Q_{G(TH)}$	Gate Charge at Threshold			1.6		
	Q_{OSS}	Output Charge	V_{DS} = 50 V, V_{GS} = 0 V		35	53	
	Q_{RR}	Source-Drain Recovery Charge			0		
Q2	C_{ISS}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V		730	880	pF
	C_{RSS}	Reverse Transfer Capacitance			5		
	C_{OSS}	Output Capacitance			500	750	
	$C_{OSS(ER)}$	Effective Output Capacitance, Energy Related (Note 2)	V_{DS} = 0 to 50 V, V_{GS} = 0 V		631		
	$C_{OSS(TR)}$	Effective Output Capacitance, Time Related (Note 3)			812		
	Q_G	Total Gate Charge	V_{DS} = 50 V, V_{GS} = 5 V, I_D = 20 A		6.8	8.7	nC
	Q_{GS}	Gate-to-Source Charge	V_{DS} = 50 V, I_D = 20 A		2.3		
	Q_{GD}	Gate-to-Drain Charge			1.4		
	$Q_{G(TH)}$	Gate Charge at Threshold			1.6		
	Q_{OSS}	Output Charge	V_{DS} = 50 V, V_{GS} = 0 V		41	62	
	Q_{RR}	Source-Drain Recovery Charge			0		

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 (Q1 & Q2): Typical Output Characteristics at 25°C

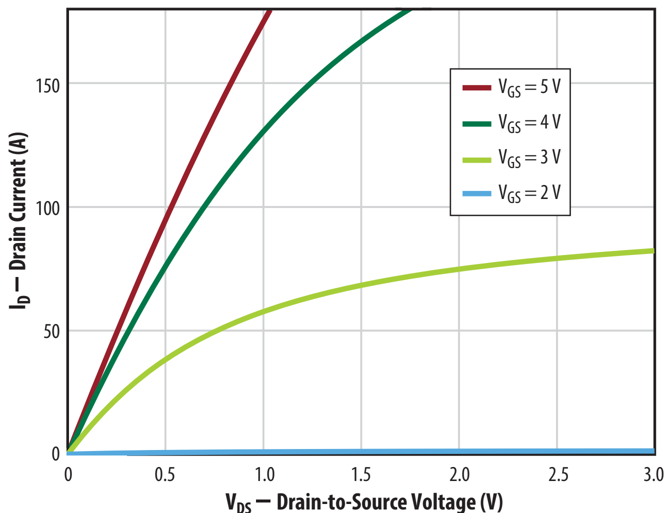


Figure 2 (Q1 & Q2): Transfer Characteristics

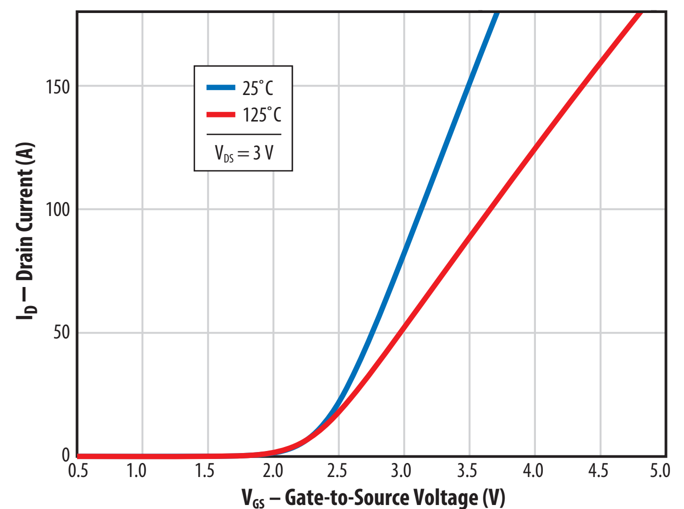


Figure 3 (Q1 & Q2): $R_{DS(on)}$ vs. V_{GS} for Various Drain Currents

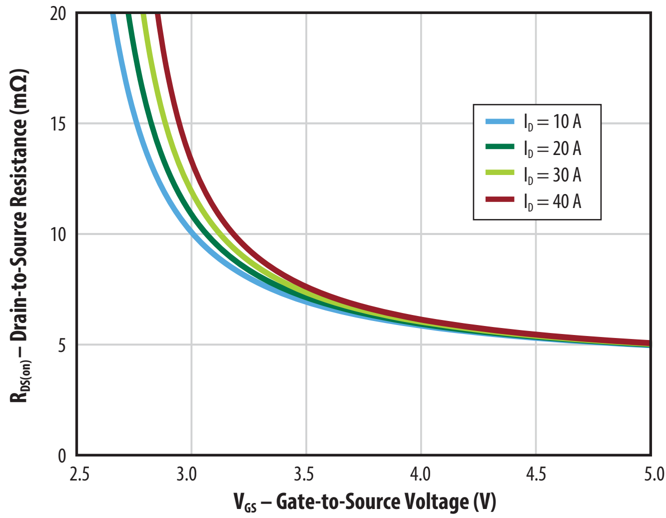


Figure 4 (Q1 & Q2): $R_{DS(on)}$ vs. V_{GS} for Various Temperatures

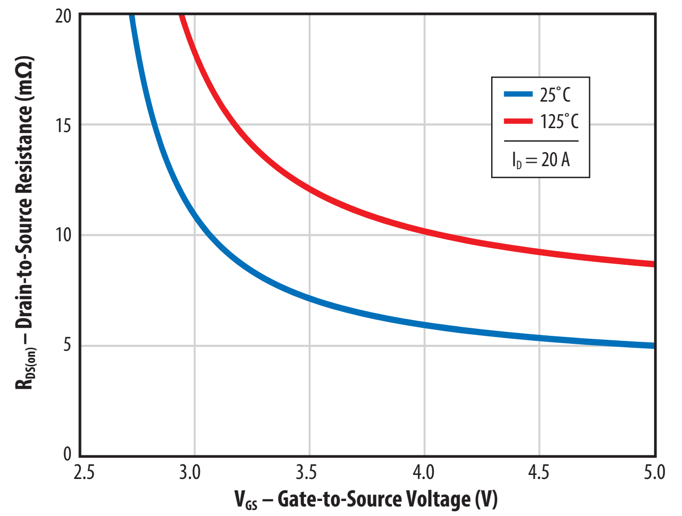


Figure 5a (Q1): Capacitance (Linear Scale)

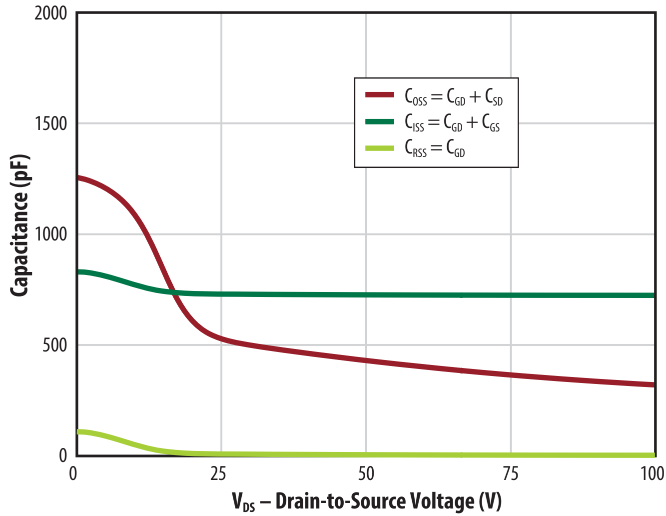


Figure 5b (Q1): Capacitance (Log Scale)

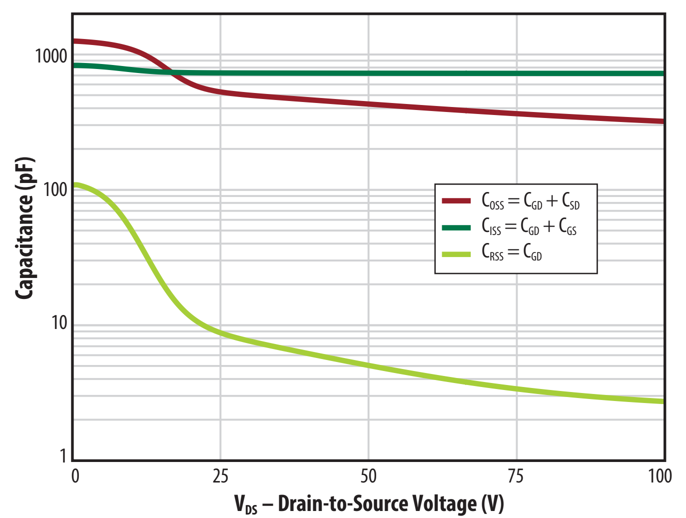


Figure 5c (Q2): Capacitance (Linear Scale)

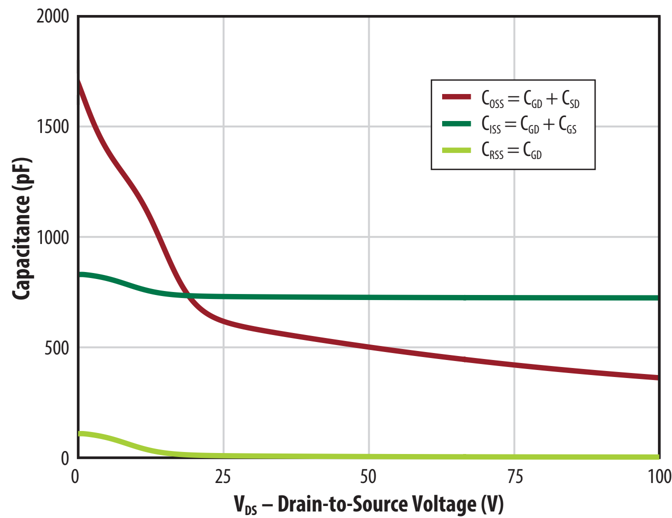


Figure 5d (Q2): Capacitance (Log Scale)

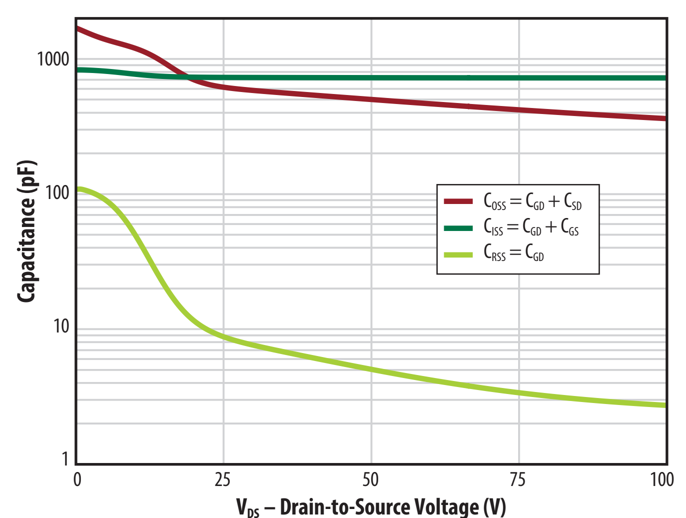


Figure 6a (Q1): Output Charge and C_{OSS} Stored Energy

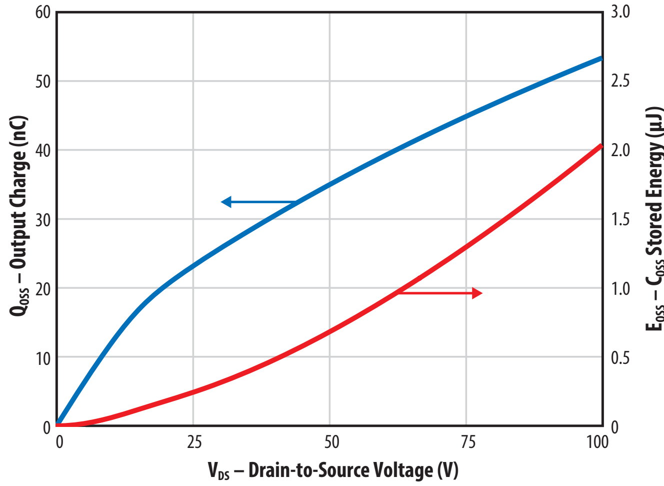


Figure 6b (Q2): Output Charge and C_{OSS} Stored Energy

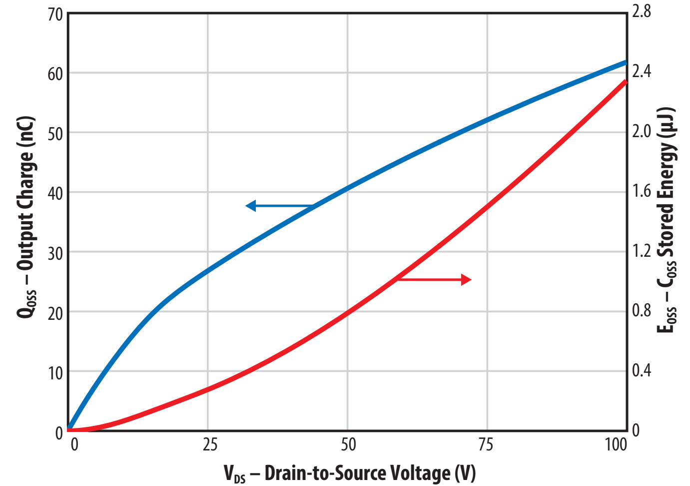


Figure 7 (Q1 & Q2): Gate Charge

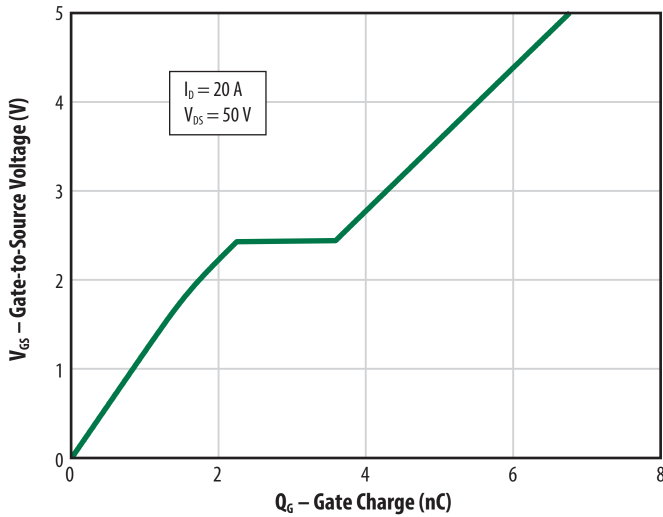


Figure 8 (Q1 & Q2): Reverse Drain-Source Characteristics

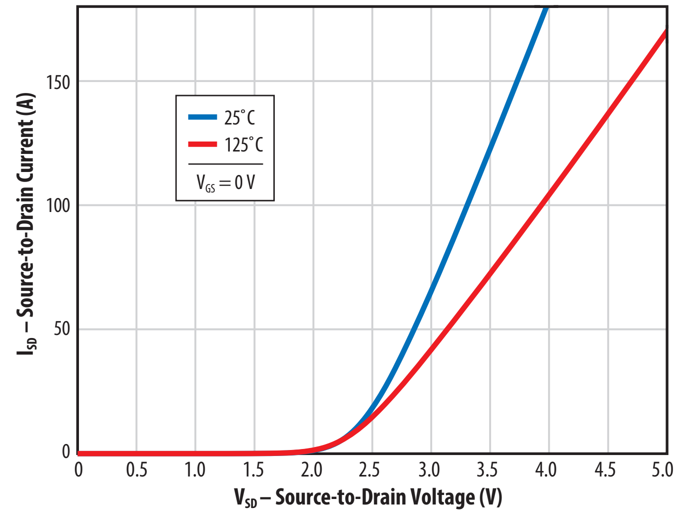


Figure 9 (Q1 & Q2):
Normalized On-State Resistance vs. Temperature

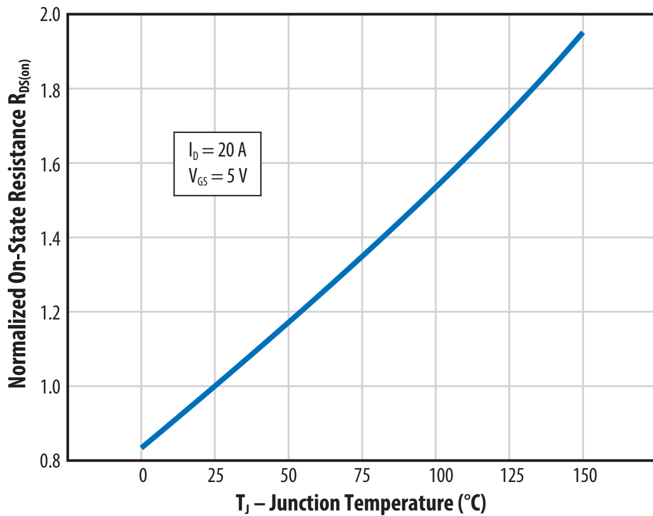


Figure 10 (Q1 & Q2):
Normalized Threshold Voltage vs. Temperature

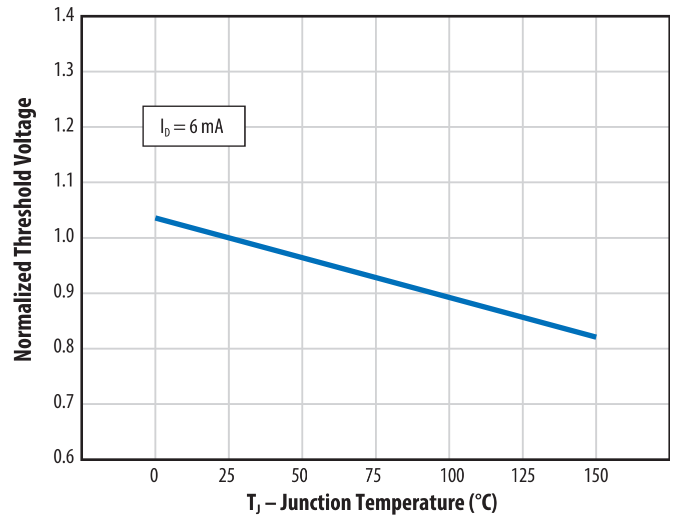


Figure 11a
Transient Thermal Response Curves

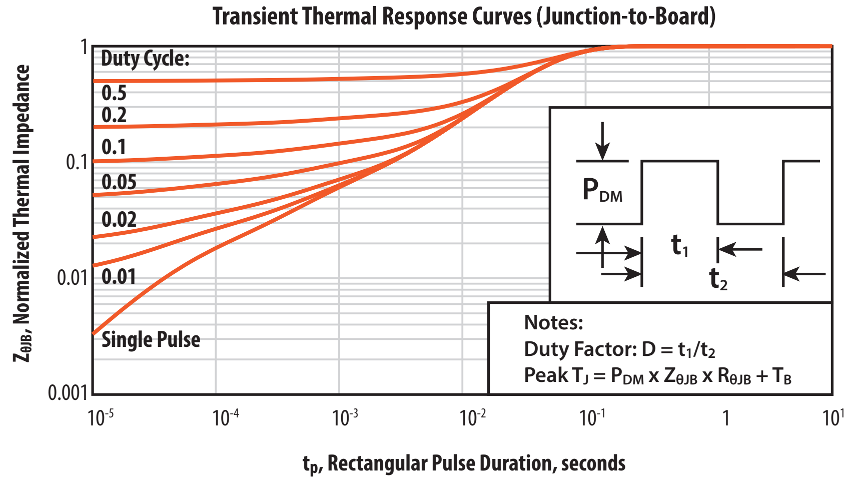


Figure 11b
Transient Thermal Response Curves

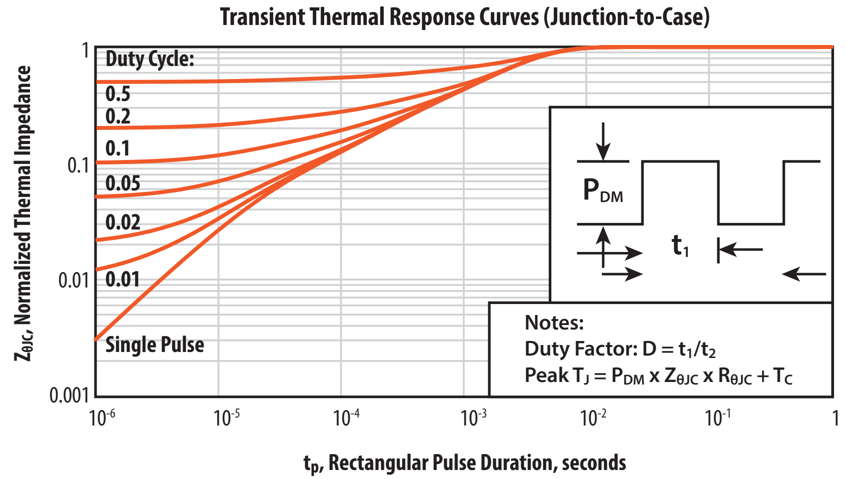


Figure 12 (Q1 & Q2): Safe Operating Area

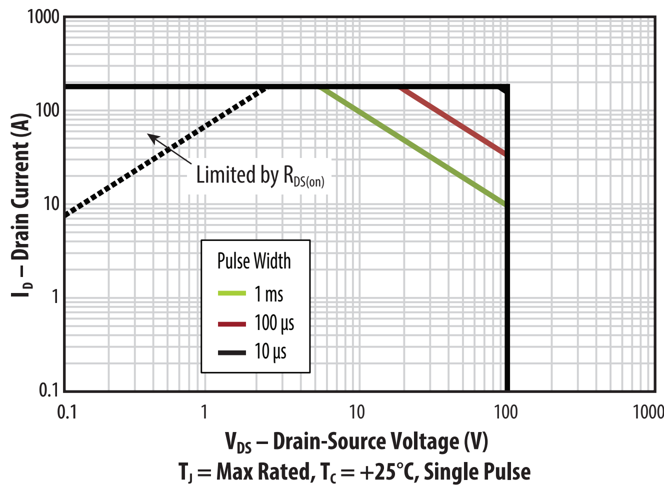
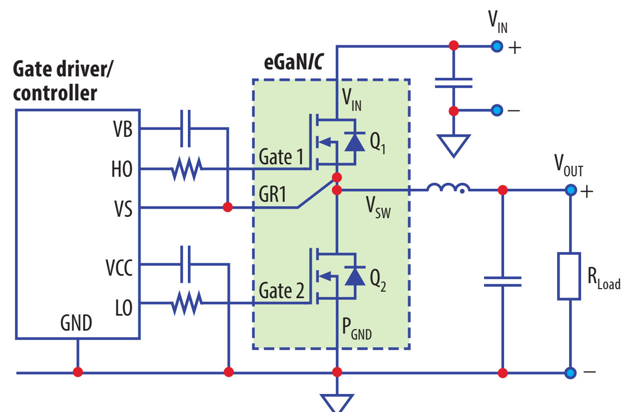
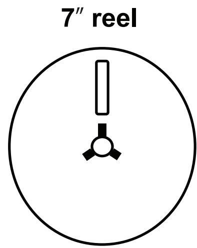


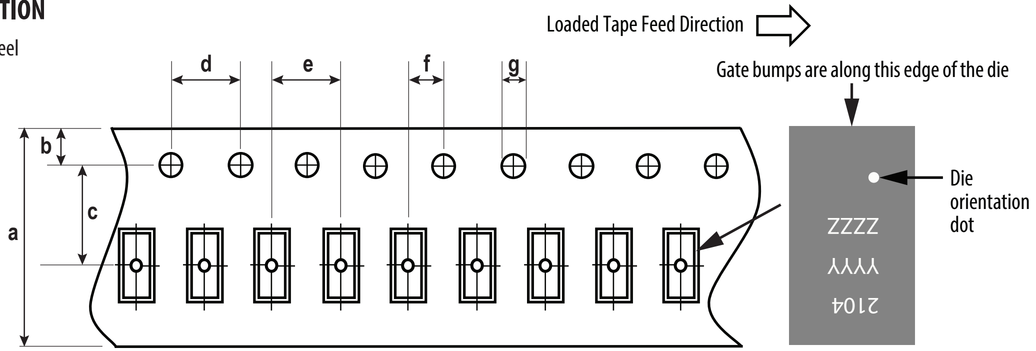
Figure 13: Typical Application Circuit



TAPE AND REEL CONFIGURATION

4mm pitch, 12mm wide tape on 7″ reel

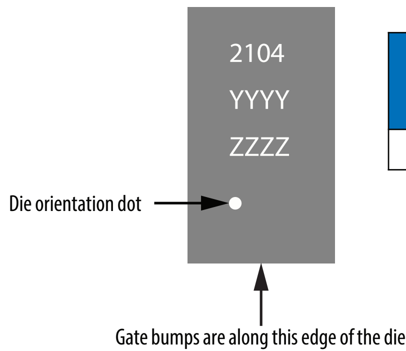




Dimension (mm)	EPC2104 (note 1) target	min	max
a	12.00	11.70	12.30
b	1.75	1.65	1.85
c (see note)	5.50	5.45	5.55
d	4.00	3.90	4.10
e	4.00	3.90	4.10
f (see note)	2.00	1.95	2.05
g	1.50	1.50	1.60

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.

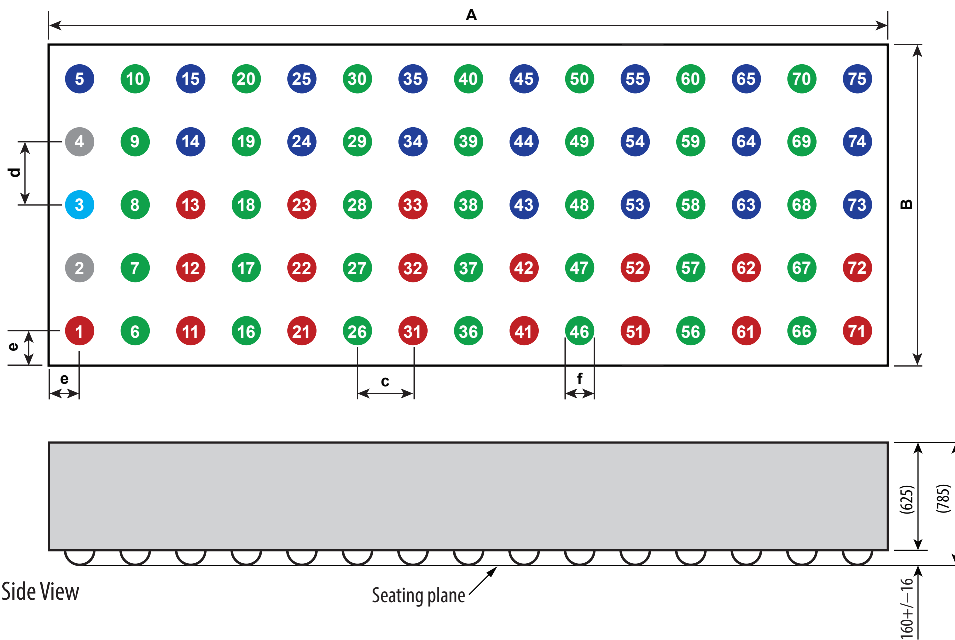
DIE MARKINGS



Part Number	Laser Markings: Part # Marking Line 1	Lot_Date Code Marking Line 2	Lot_Date Code Marking Line 3
EPC2104	2104	YYYY	ZZZZ

DIE OUTLINE

Solder Bump View



DIM	MIN	Nominal	MAX
A	6020	6050	6080
B	2270	2300	2330
c	400	400	400
d	450	450	450
e	210	225	240
f	187	208	229

Pad 2 is G1; Pad 3 is Q1 Gate Return; Pad 4 is G2;

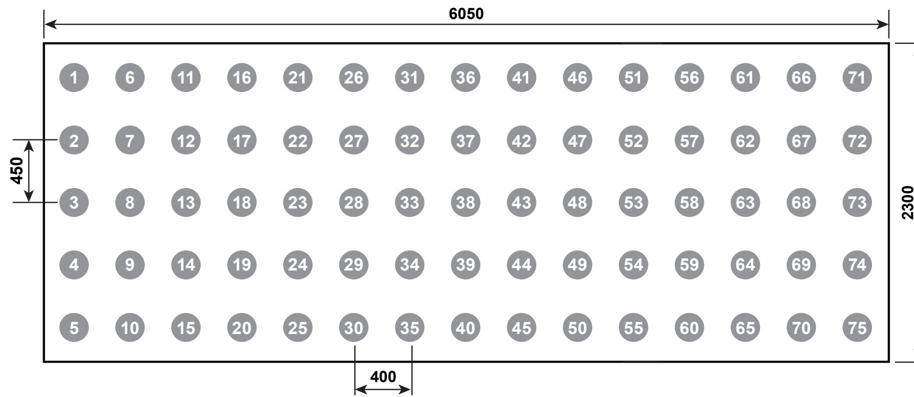
Pads 1, 11, 12, 13, 21, 22, 23, 31, 32, 33, 41, 42, 51, 52, 61, 62, 71, 72 are V_{IN};

Pads 5, 14, 15, 24, 25, 34, 35, 43, 44, 45, 53, 54, 55, 63, 64, 65, 73, 74, 75 Ground;

Pads 6, 7, 8, 9, 10, 16, 17, 18, 19, 20, 26, 27, 28, 29, 30, 36, 37, 38, 39, 40, 46, 47, 48, 49, 50, 56, 57, 58, 59, 60, 66, 67, 68, 69, 70 are Switch Node

RECOMMENDED LAND PATTERN

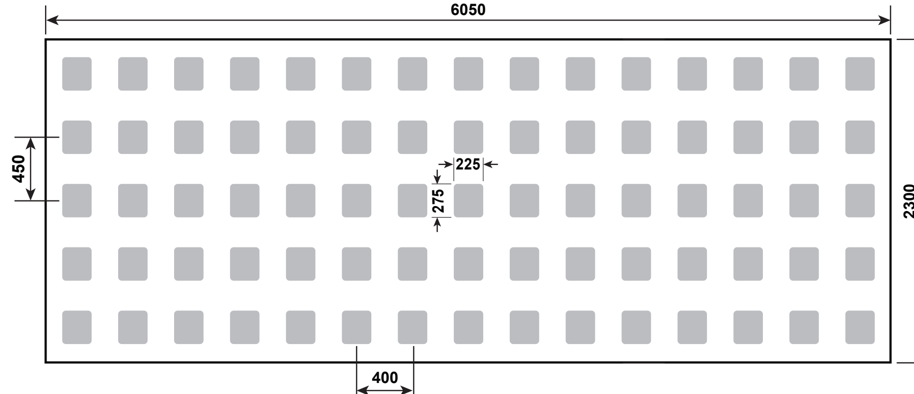
(measurements in µm)



The land pattern is solder mask defined. Suggest SMD Pads at 200 +20/–10 µm. 190 µm minimum.

RECOMMENDED STENCIL DRAWING

(measurements in µm)



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: http://epc-co.com/epc/DesignSupport/AssemblyBasics.aspx

Efficient Power Conversion Corporation (EPC) reserves the right to make changes without further notice to any products herein to improve reliability, function or design. EPC does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others.

eGaN® is a registered trademark of Efficient Power Conversion Corporation.

EPC Patent Listing: epc-co.com/epc/AboutEPC/Patents.aspx

Information subject to change without notice.

Revised December, 2017