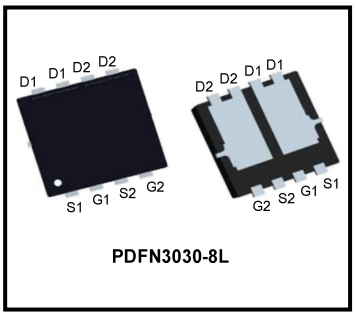
EMQ40DN03T1

30V Dual N-Channel Enhancement Mode Power MOSFET

Description

EMQ40DN03T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.



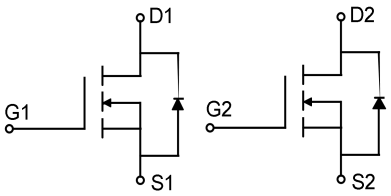
PDFN3030-8L

Features

- V_{DS}= 30V, I_D = 40A
  $R_{DS(on)}$ < 9mΩ @ V_{GS} = 10V
  $R_{DS(on)}$ < 14mΩ @ V_{GS} = 4.5V
- Green Device Available
- Low Gate Charge
- Advanced High Cell Density Trench Technology
- 100% EAS Guaranteed

Applications

- Power Management Switches
- DC/DC Converter



Absolute Maximum Ratings (TA = 25°C, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	40	A
	T_C=100°C		25.3	
Pulsed Drain Current[1]		I_{DM}	160	A
Single Pulse Avalanche Energy[2]		EAS	31.2	mJ
Total Power Dissipation	T_C=25°C	P_D	28.4	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient[3]	$R_{\theta JA}$	73	°C/W
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	4.4	°C/W

Electrical Characteristics (T_J = 25°C, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	30	-	-	V
Gate-Body Leakage current		I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
	T_J=100°C			-	-	100	
Gate-Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.6	2.5	V
Drain-Source On-Resistance[4]		$R_{DS(on)}$	V_{GS} = 10V, I_D = 8A	-	7	9	mΩ
			V_{GS} = 4.5V, I_D = 6A	-	10.5	14	
Forward Transconductance[4]		g_{fs}	V_{DS} = 10V, I_D= 5A	-	20	-	S
Dynamic Characteristics[5]							
Input Capacitance		C_{iss}	V_{DS} = 15V, V_{GS} =0V, f =1MHz	-	1390	-	pF
Output Capacitance		C_{oss}		-	178	-	
Reverse Transfer Capacitance		C_{rss}		-	141	-	
Gate Resistance		R_g	f =1MHz	-	2.8	-	Ω
Switching Characteristics[5]							
Total Gate Charge		Q_g	V_{GS} = 4.5V, V_{DS} = 15V, I_D= 10A	-	9.5	-	nC
Gate-Source Charge		Q_{gs}		-	2.5	-	
Gate-Drain Charge		Q_{gd}		-	1.9	-	
Turn-On Delay Time		$t_{d(on)}$	V_{GS} =10V, V_{DD} = 15V, R_G = 3Ω, I_D= 10A	-	8.3	-	ns
Rise Time		t_r		-	25	-	
Turn-Off Delay Time		$t_{d(off)}$		-	13	-	
Fall Time		t_f		-	6.2	-	
Reverse Recovery Time		trr	I_F=10A, dI_F/dt=100A/μs	-	9	-	ns
Reverse Recovery Charge		Qrr		-	2	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage[4]		V_{SD}	I_S = 1A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current	T_C=25°C	I_S	-	-	-	40	A

Note :

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
2. The EAS data shows Max. rating . The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=25A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

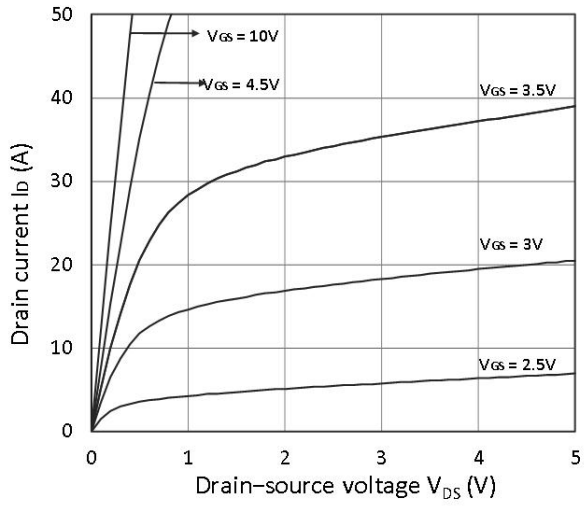


Figure 1. Output Characteristics

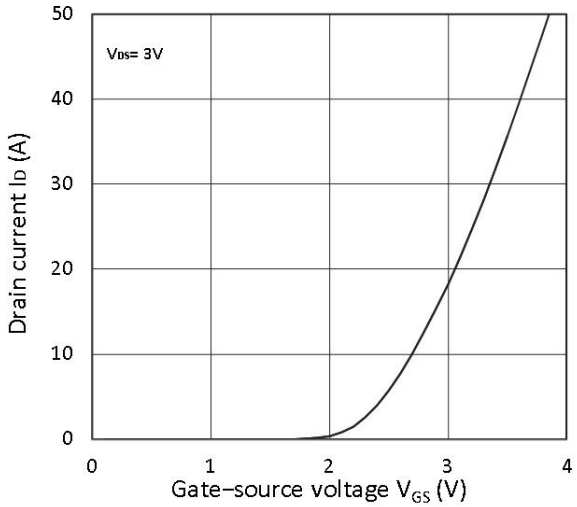


Figure 2. Transfer Characteristics

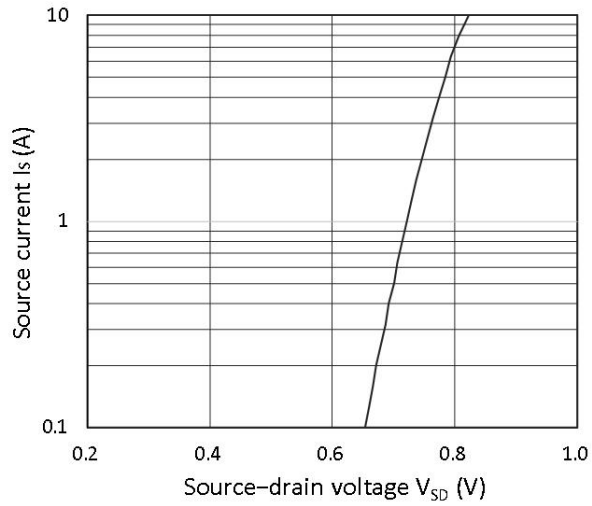


Figure 3. Forward Characteristics of Reverse

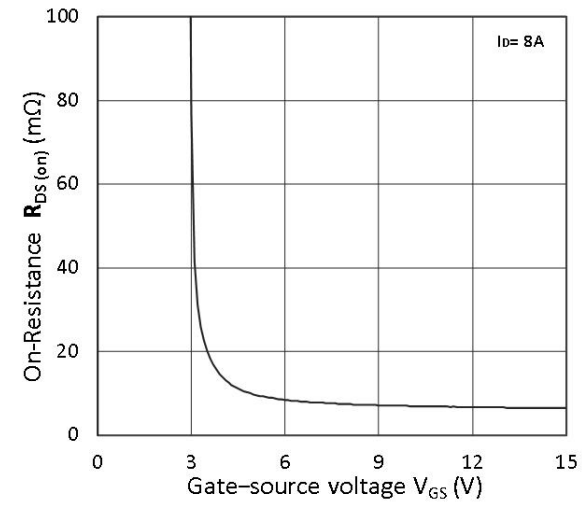


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

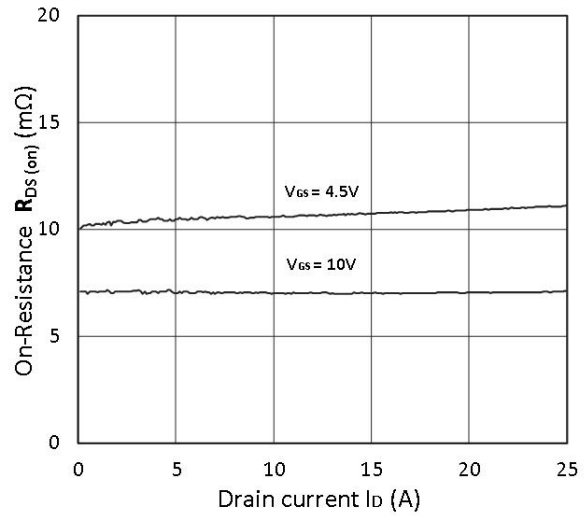


Figure 5. $R_{DS(ON)}$ vs. I_D

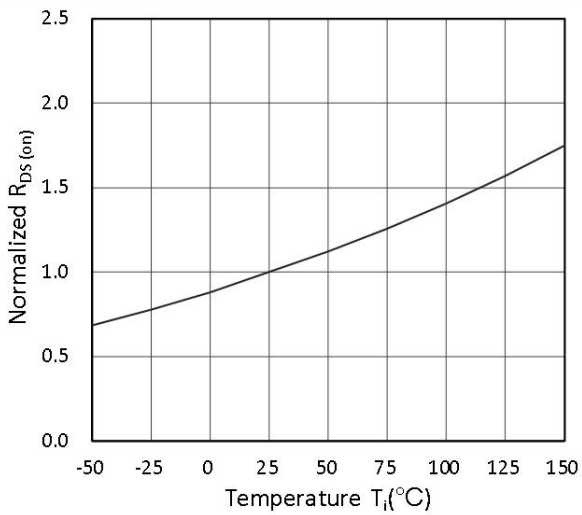


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

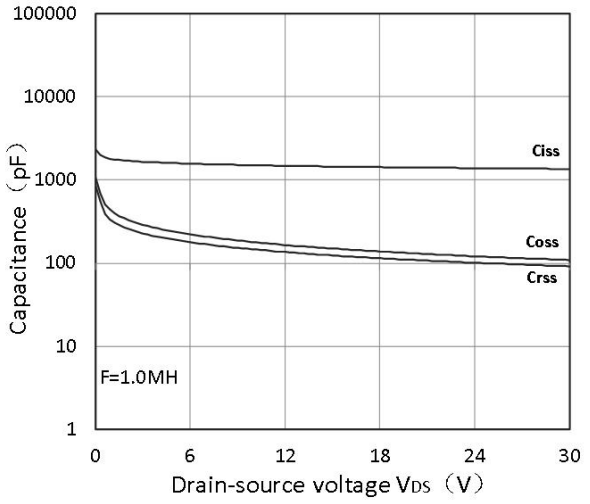


Figure 7. Capacitance Characteristics

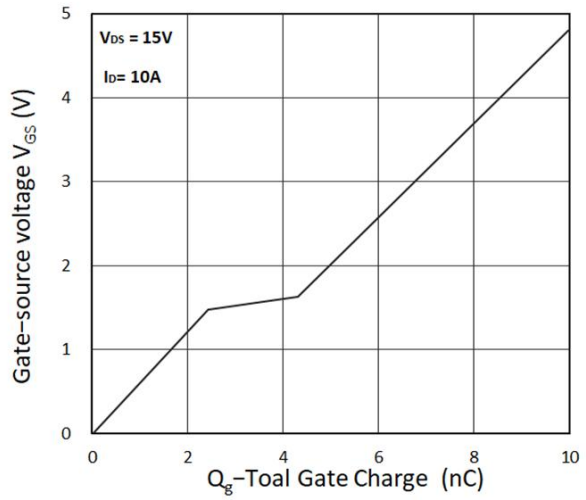


Figure 8. Gate Charge Characteristics

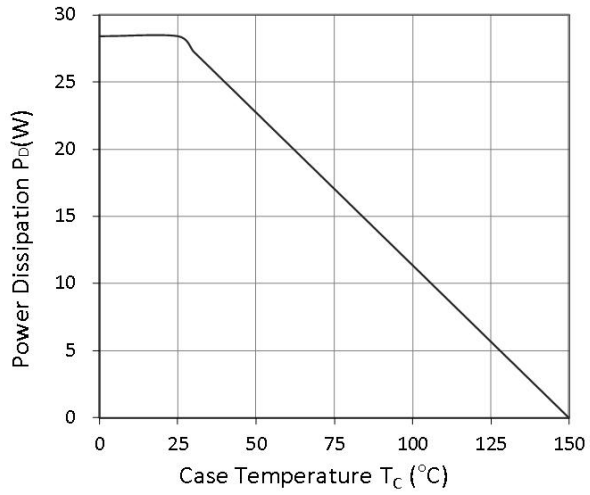


Figure 9. Power Dissipation

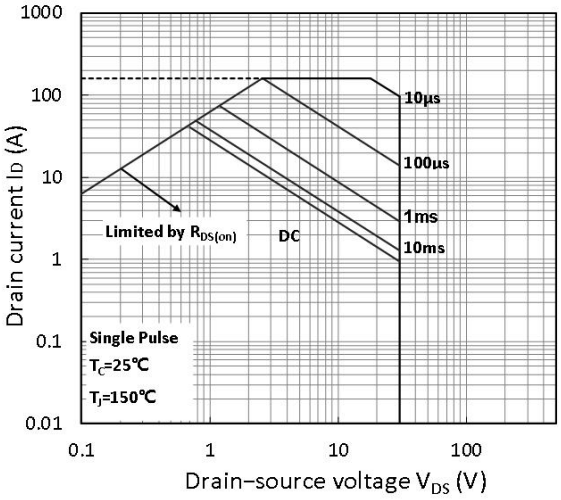


Figure10. Safe Operating Area

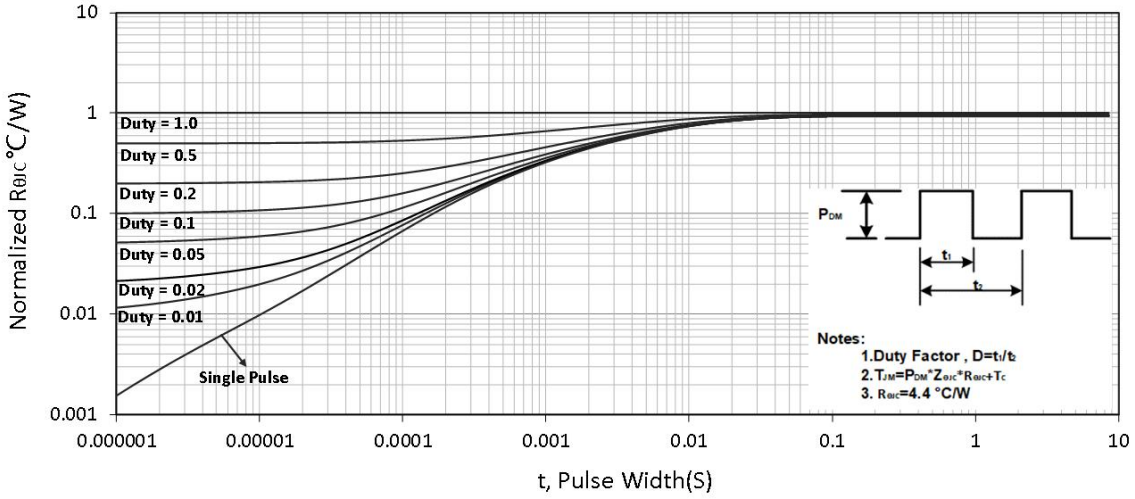


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

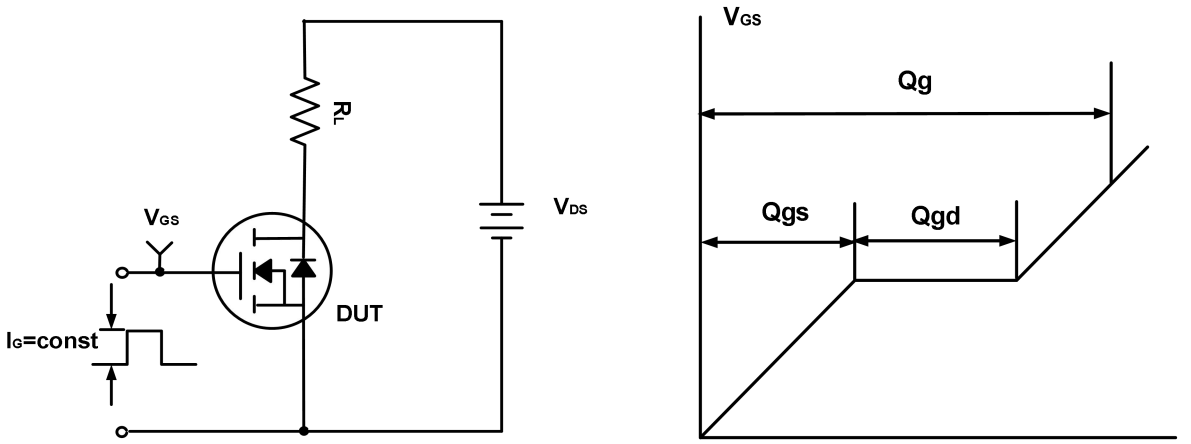


Figure A. Gate Charge Test Circuit & Waveforms

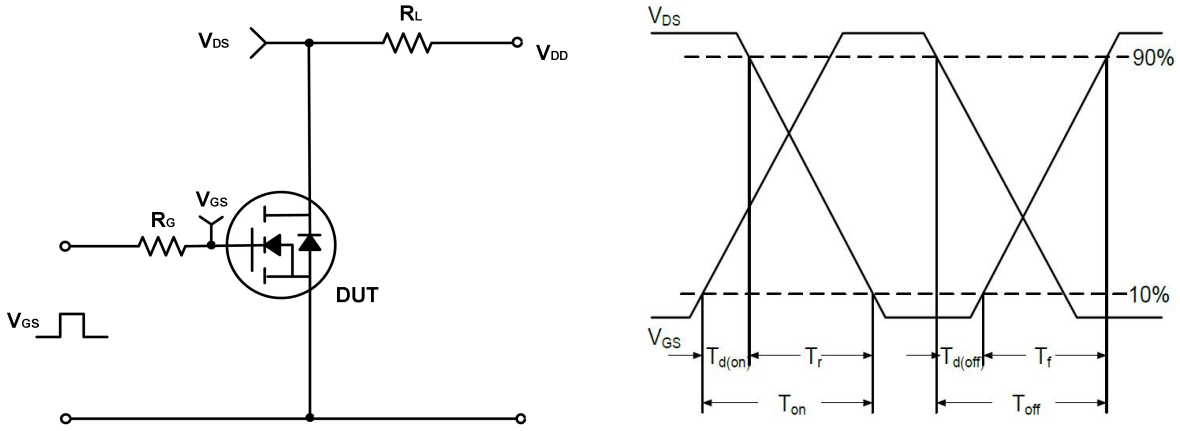


Figure B. Switching Test Circuit & Waveforms

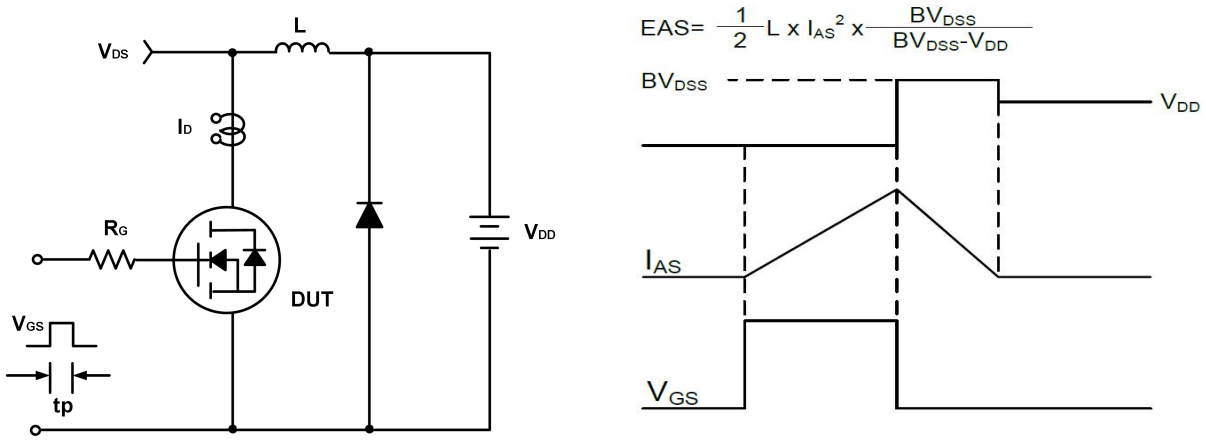
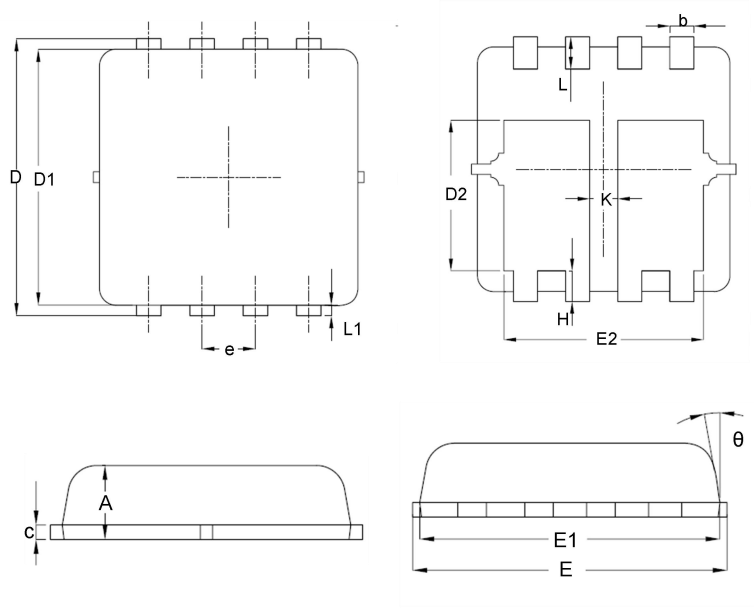


Figure C. Unclamped Inductive Switching Circuit & Waveforms

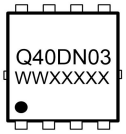
Mechanical Dimensions for PDFN3030-8L

PACKAGE OUTLINE

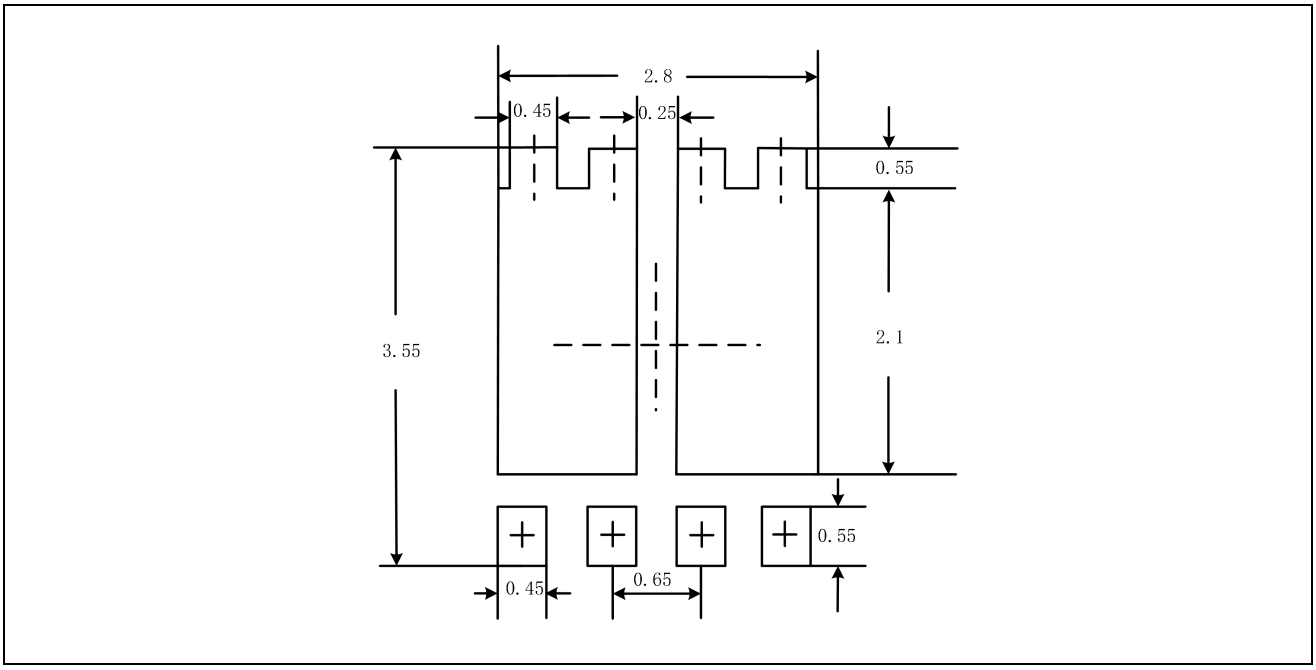


SYMBOL	MM	
	MIN	MAX
A	0.70	0.95
b	0.20	0.40
c	0.10	0.25
D	3.15	3.45
D1	2.90	3.20
D2	1.53	1.98
E	3.00	3.40
E1	3.00	3.20
E2	2.15	2.75
e	0.65BSC	
H	0.30	0.52
L	0.30	0.50
L1	0.15REF	
K	0.28	0.48
θ	-	12°

Marking Codes

Part Number	Marking Code
EMQ40DN03T1	 Q40DN03 = Device code WWXXXXX= Date code

Pattern



Revision History

No.	Version	Date	Revision Item	Request	Function and characteristic checking	Package dimension checking	Typos checking
1	1.0	2021-09-18	Released Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying
2	1.1	2023-4-6	Add Pattern	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying