

## N-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

- Surface-mounted package  
 Advanced trench cell design
- Extremely low threshold voltage  
 ESD protected (HBM > 2KV)

#### 1.2 Applications

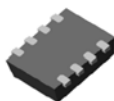
- Portable appliances
- Battery management

#### 1.3 Quick reference

- $P_{tot} \leq 1.4 \text{ W}$
- $BV \geq 20 \text{ V}$
- $I_D \leq 6.8 \text{ A}$
- $R_{DS(ON)} \leq 20 \text{ m}\Omega @ V_{GS} = 4.5 \text{ V}$
- $R_{DS(ON)} \leq 28 \text{ m}\Omega @ V_{GS} = 2.5 \text{ V}$
- $R_{DS(ON)} \leq 48 \text{ m}\Omega @ V_{GS} = 1.8 \text{ V}$

### 2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Source(S1)	<p>Top View DFN3X3-8L</p>	
2	Gate(G1)		
3	Source(S2)		
4	Gate(G2)		
5,6	Drain(D2)		
7,8	Drain(D1)		



## 3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	Drain-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$	-	20	V
$V_{GS}$	Gate-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$	-	$\pm 12$	V
$I_D^*$	Drain Current	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	6.8	A
		$T_A = 100\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	4.3	A
$I_{DM}^{***}$	Pulsed Drain Current	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	25	A
$I_S^*$	Diode Forward Current	$T_A = 25\text{ }^\circ\text{C}$	-	1.5	A
$P_{tot}^*$	Total Power Dissipation	$T_A = 25\text{ }^\circ\text{C}$	-	1.4	W
$T_{stg}$	Storage Temperature		- 55	150	$^\circ\text{C}$
$T_J$	Junction Temperature		- 55	150	$^\circ\text{C}$
$R_{\theta JA}^*$	Thermal Resistance- Junction to Ambient		-	89	$^\circ\text{C} / \text{W}$

Notes :

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$

\*\* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

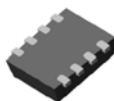
## 4. Marking Information

Product Name	Marking
iM8601R	<div style="border: 1px solid black; padding: 2px; display: inline-block;">                     iM8601R XXXXX                 </div> X : Date Code

## 5. Ordering Code

iM8601R □ └─── Assembly Material	Assembly Material G: Halogen and Lead Free Device
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Note: inergy defines “ Green ” as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C)

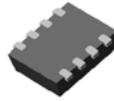


## 6. Electrical Characteristics ( $T_A = 25\text{ }^\circ\text{C}$ Unless Otherwise Noted)

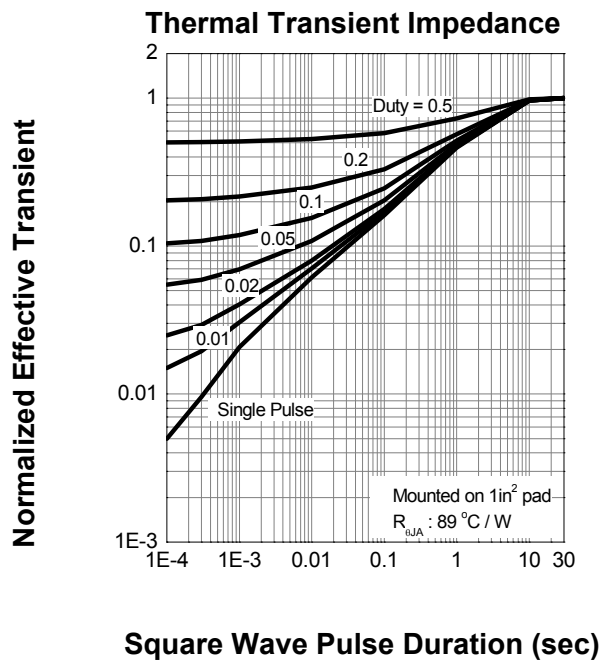
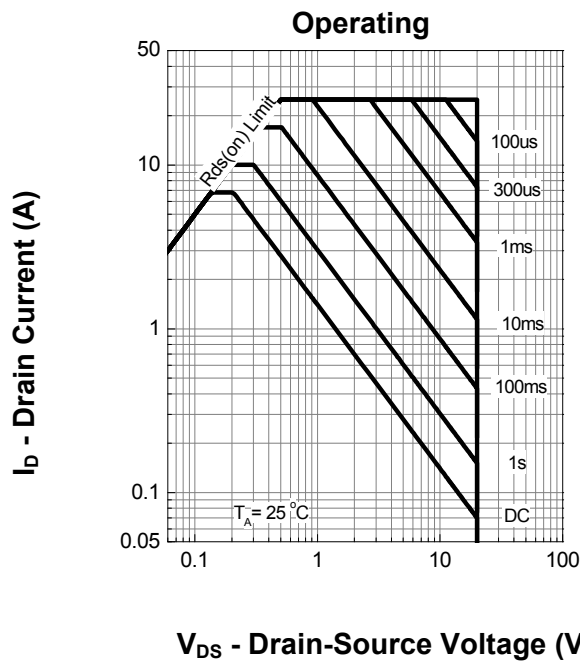
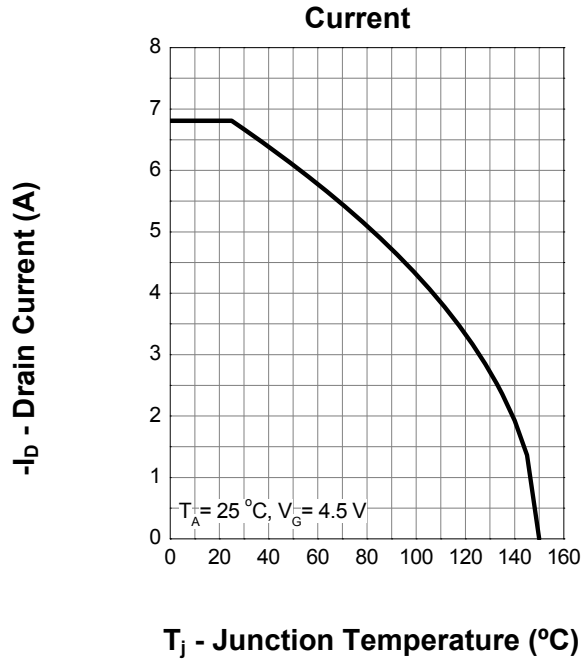
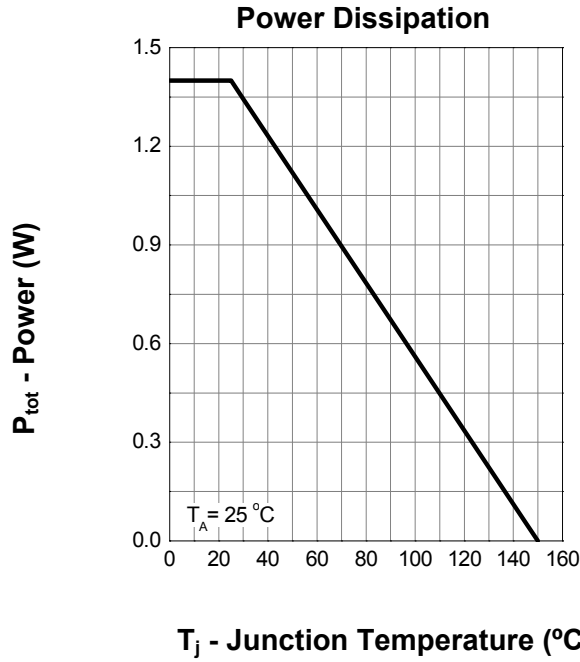
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_{DS} = 250\text{ }\mu\text{A}$	20	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = 250\text{ }\mu\text{A}$	0.5	0.7	1	V
$I_{DSS}$	Drain Leakage Current	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$T_J = 85\text{ }^\circ\text{C}$	-	-	30	$\mu\text{A}$
$I_{GSS}$	Gate Leakage Current	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	-	-	$\pm 10$	$\mu\text{A}$
$R_{DS(ON)}^a$	On-State Resistance	$V_{GS} = 4.5\text{ V}, I_{DS} = 6.8\text{ A}$	-	16	20	m $\Omega$
		$V_{GS} = 2.5\text{ V}, I_{DS} = 5\text{ A}$	-	20	28	
		$V_{GS} = 1.8\text{ V}, I_{DS} = 4\text{ A}$	-	32	48	
<b>Diode Characteristics</b>						
$V_{SD}^a$	Diode Forward Voltage	$I_{SD} = 1.5\text{ A}, V_{GS} = 0\text{ V}$	-	0.7	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 6.8\text{ A}, dI_{SD}/dt = 100\text{ A}/\mu\text{s}$	-	25	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	17	-	nC
<b>Dynamic Characteristics<sup>b</sup></b>						
$R_G$	Gate Resistance	$V_{GS} = V_{DS} = 0\text{ V}, F = 1\text{ MHz}$	-	1.0	-	K $\Omega$
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 10\text{ V}$ Frequency = 1 MHz	-	680	-	pF
$C_{oss}$	Output Capacitance		-	145	-	
$C_{rss}$	Reverse Transfer Capacitance		-	138	-	
$t_d(on)$	Turn-on Delay Time	$V_{DS} = 10\text{ V}, V_{GEN} = 4.5\text{ V},$ $R_G = 6\text{ }\Omega, R_L = 10\text{ }\Omega,$ $I_{DS} = 1\text{ A}$	-	6	12	nS
$t_r$	Turn-on Rise Time		-	12	24	
$t_d(off)$	Turn-off Delay Time		-	65	120	
$t_f$	Turn-off Fall Time		-	35	65	
<b>Gate Charge Characteristics<sup>b</sup></b>						
$Q_g$	Total Gate Charge	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V},$ $I_{DS} = 6.8\text{ A}$	-	15	18	nC
$Q_{gs}$	Gate-Source Charge		-	0.9	-	
$Q_{gd}$	Gate-Drain Charge		-	5.8	-	

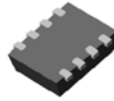
Notes :

- a : Pulse test ; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$
- b : Guaranteed by design, not subject to production testing

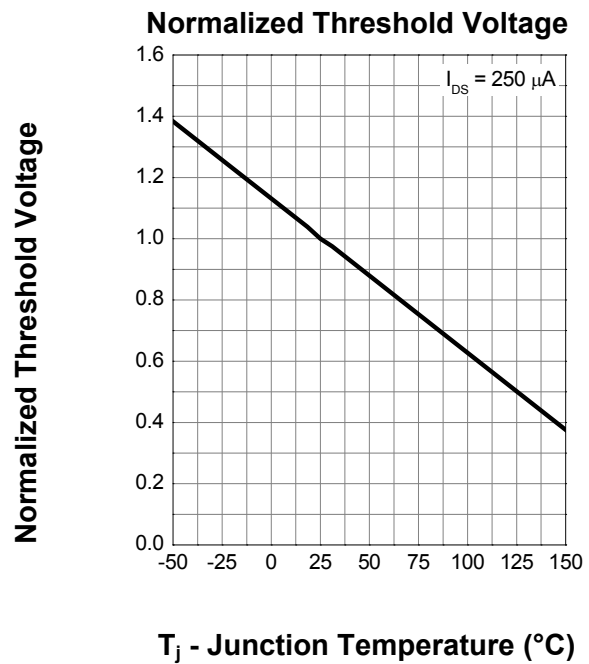
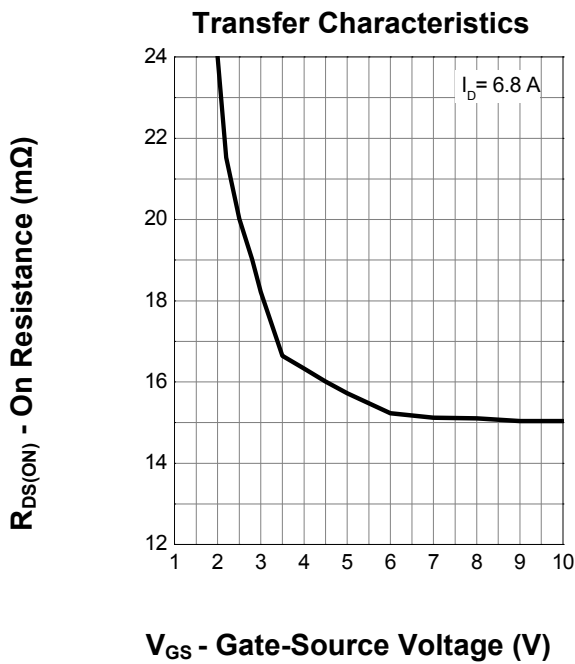
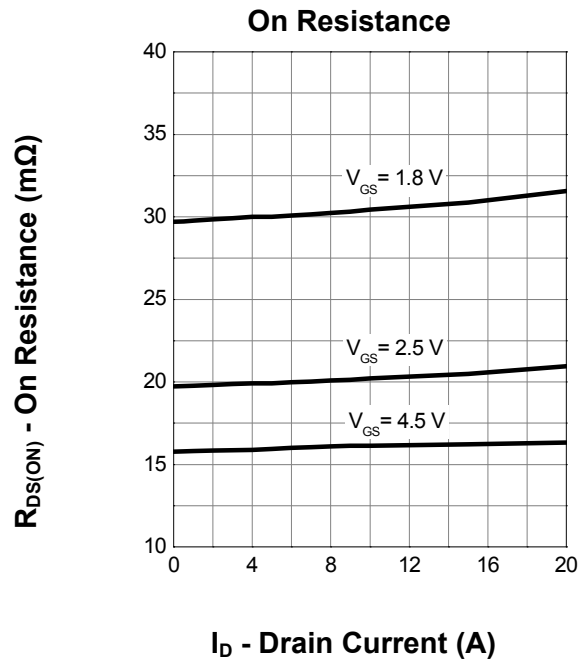
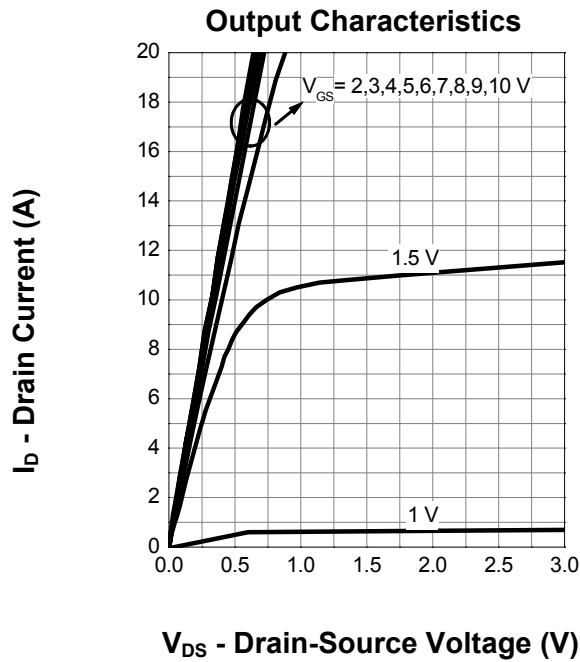


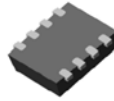
## 7. Typical Characteristics



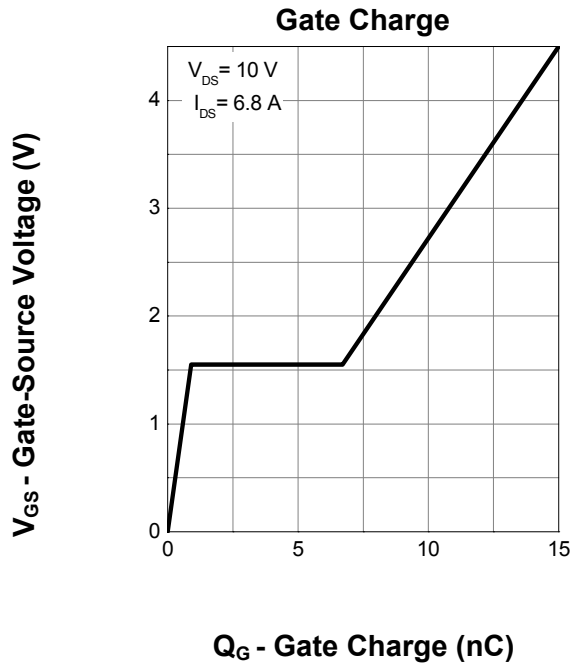
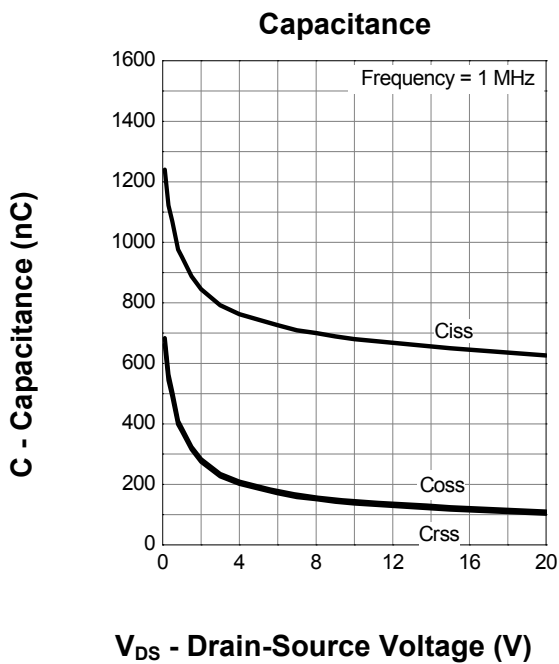
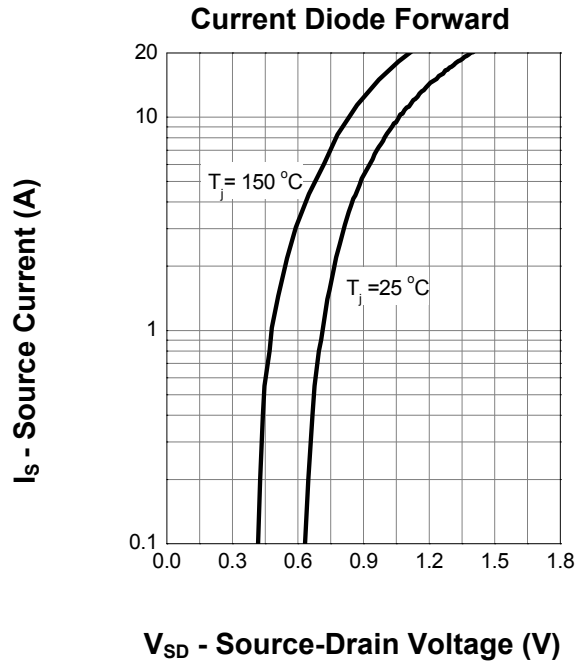
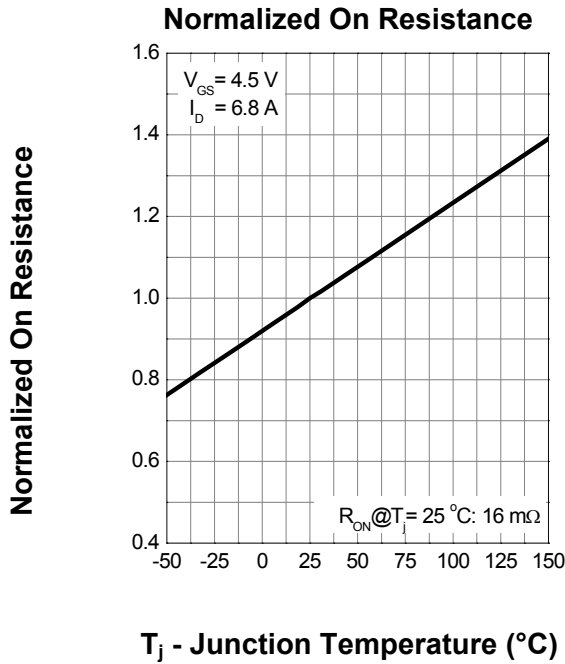


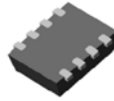
## 7. Typical Characteristics (cont.)





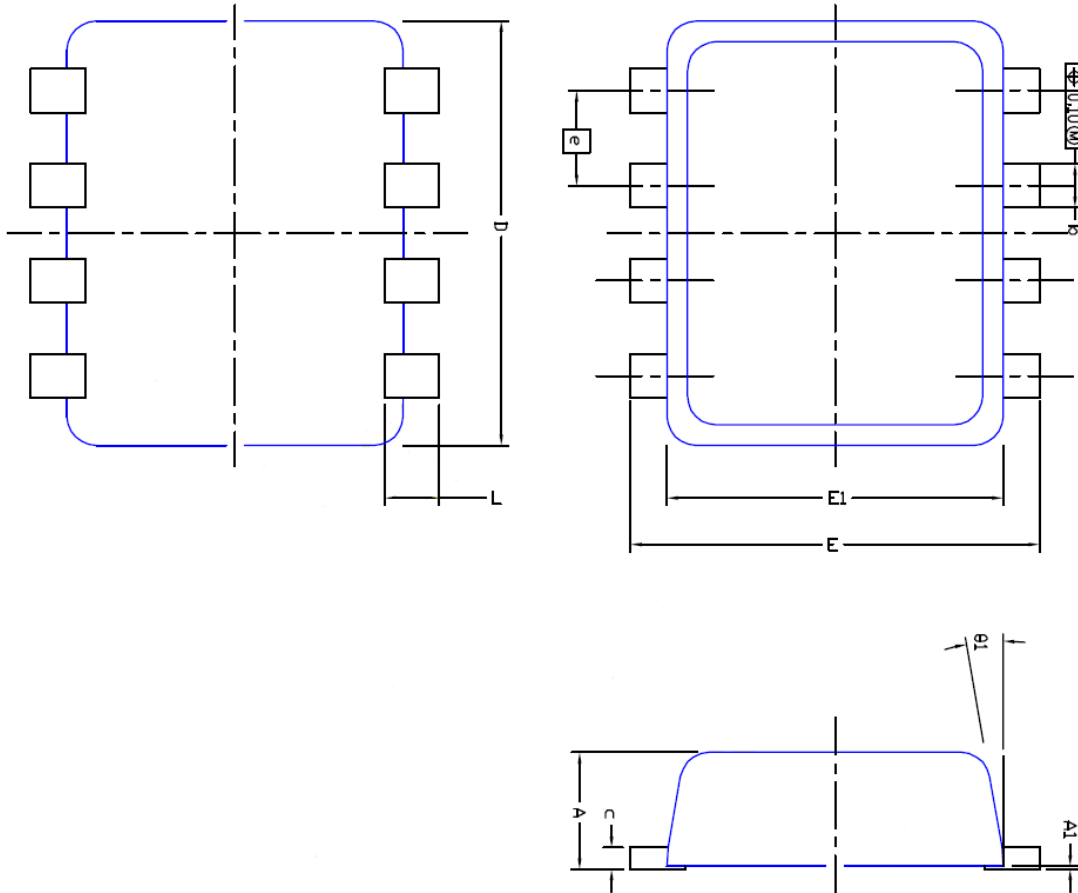
## 7. Typical Characteristics (cont.)





## 8. Package Dimensions

### DFN3X3-8L (NEP)



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	0.70	0.90
A1	0.00	0.05
b	0.24	0.35
c	0.08	0.25
D	2.90 BSC	
E	2.80 BSC	
E1	2.30 BSC	
e	0.65 BSC	
L	0.20	0.45
L1	0.00	0.10
$\theta 1$	0°	12°