Ordering number : EN9050A

# BXL4004

## N-Channel Power MOSFET
## 40V, 100A, 3.9mΩ, TO-220-3L

ON Semiconductor®
http://onsemi.com

### Features

- ON-resistance $R_{DS}(on)1$=3mΩ (typ.)
- 4.5V drive
- Input capacitance Ciss=8200pF (typ.)

### Specifications

**Absolute Maximum Ratings** at Ta=25°C

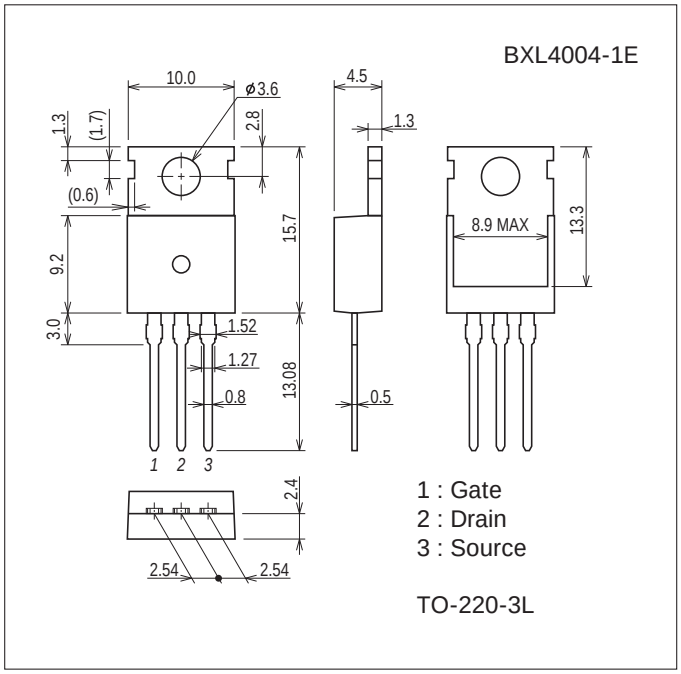
| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Drain-to-Source Voltage | $V_{DSS}$ | | 40 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | | ±20 | V |
| Drain Current (DC) | $I_D$ | | 100 | A |
| Drain Current (Pulse) | $I_{DP}$ | PW≤10μs, duty cycle≤1% | 400 | A |
| Allowable Power Dissipation | $P_D$ | | 1.75 | W |
| | | Tc=25°C | 75 | W |
| Channel Temperature | Tch | | 150 | °C |
| Storage Temperature | Tstg | | −55 to +150 | °C |
| Avalanche Energy (Single Pulse) *1 | $E_{AS}$ | | 420 | mJ |
| Avalanche Current *2 | $I_{AV}$ | | 60 | A |

Note :*1 $V_{DD}$=24V, L=100μH, $I_{AV}$=60A (Fig.1)
*2 L≤100μH, Single pulse

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

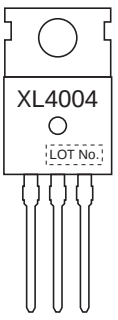
unit : mm (typ)
7536-001



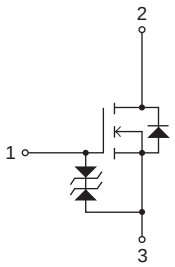

### Product & Package Information

- Package : TO-220-3L
- JEITA, JEDEC : SC-46, TO-220AB
- Minimum Packing Quantity : 50 pcs./magazine

### Marking



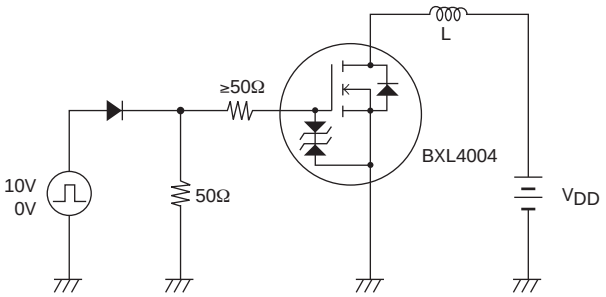

### Electrical Connection



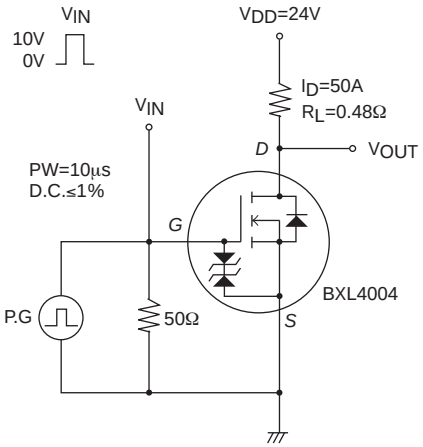
## Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=1mA, $V_{GS}$=0V | 40 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=40V, $V_{GS}$=0V | | | 10 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±16V, $V_{DS}$=0V | | | ±10 | μA |
| Cutoff Voltage | $V_{GS}(off)$ | $V_{DS}$=10V, $I_D$=1mA | 1.2 | | 2.6 | V |
| Forward Transfer Admittance | \| yfs \| | $V_{DS}$=10V, $I_D$=50A | | 120 | | S |
| Static Drain-to-Source On-State Resistance | $R_{DS}(on)1$ | $I_D$=50A, $V_{GS}$=10V | | 3 | 3.9 | mΩ |
| | $R_{DS}(on)2$ | $I_D$=50A, $V_{GS}$=4.5V | | 4.7 | 6.6 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=20V, f=1MHz | | 8200 | | pF |
| Output Capacitance | Coss | | | 940 | | pF |
| Reverse Transfer Capacitance | Crss | | | 700 | | pF |
| Turn-ON Delay Time | $t_d(on)$ | See Fig.2 | | 65 | | ns |
| Rise Time | $t_r$ | | | 390 | | ns |
| Turn-OFF Delay Time | $t_d(off)$ | | | 510 | | ns |
| Fall Time | $t_f$ | | | 360 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=24V, $V_{GS}$=10V, $I_D$=100A | | 140 | | nC |
| Gate-to-Source Charge | Qgs | | | 43 | | nC |
| Gate-to-Drain “Miller” Charge | Qgd | | | 25 | | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=100A, $V_{GS}$=0V | | 1.0 | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | See Fig.3 | | 90 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | $I_S$=100A, $V_{GS}$=0V, di/dt=100A/μs | | 230 | | nC |

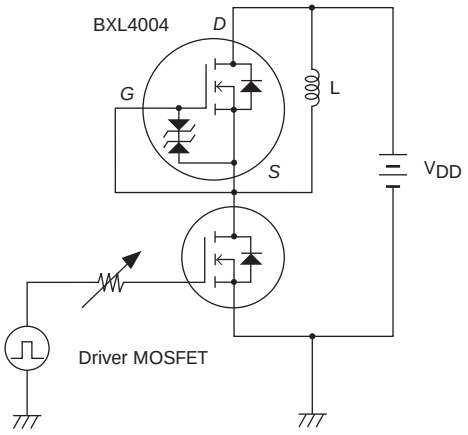
### Fig.1 Unclamped Inductive Switching Test Circuit




### Fig.2 Switching Time Test Circuit

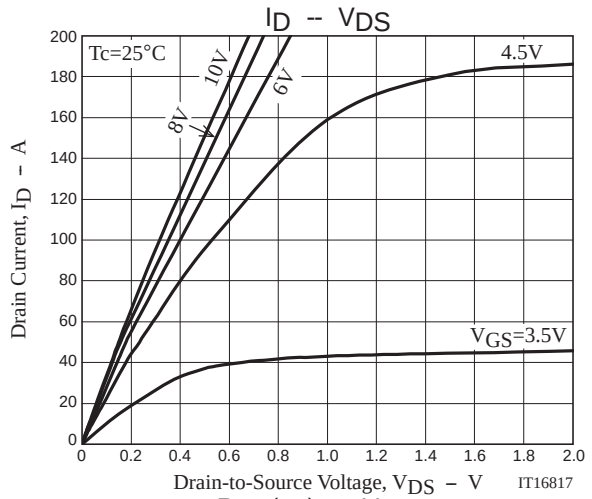


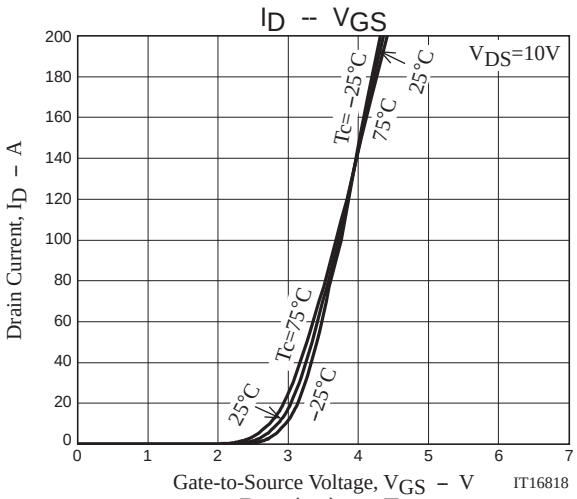

### Fig.3 Reverse Recovery Time Test Circuit

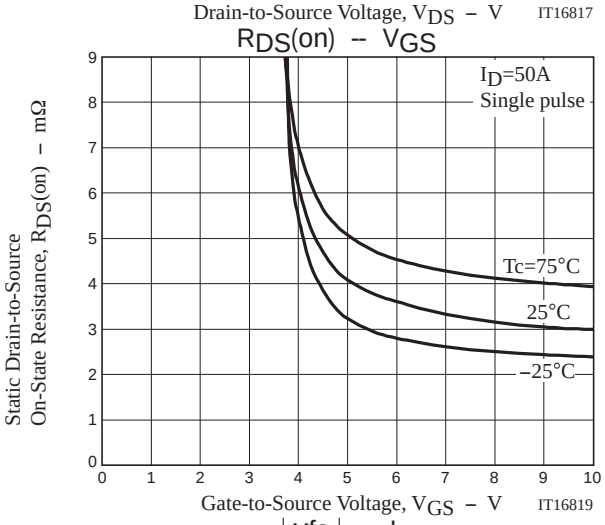


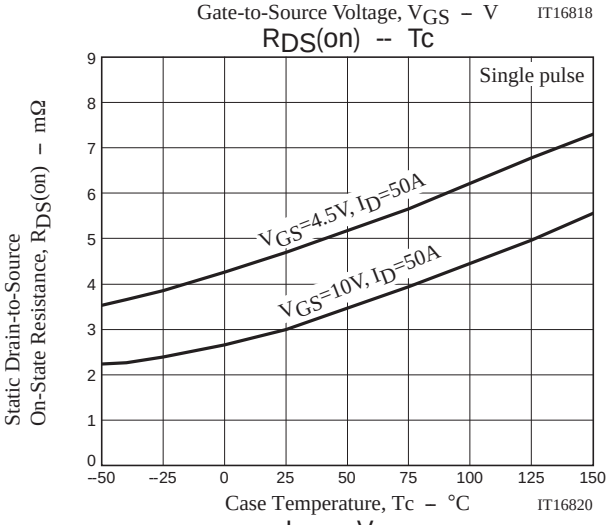

## Ordering Information

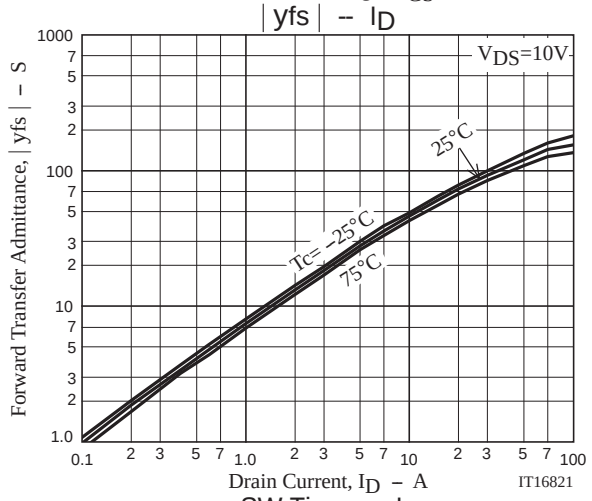
| Device | Package | Shipping | memo |
|---|---|---|---|
| BXL4004-1E | TO-220-3L | 50pcs./magazine | Pb Free and Halogen Free |

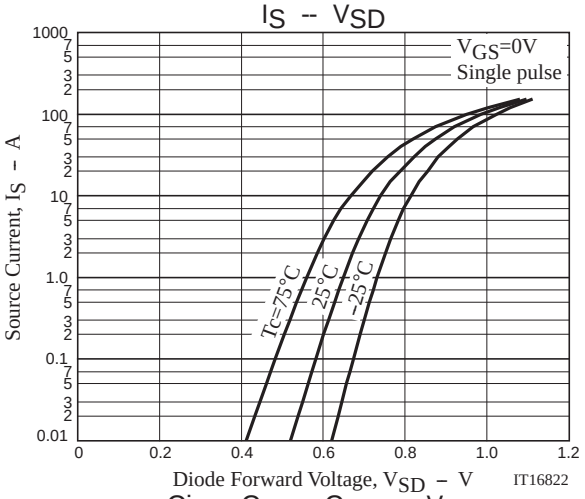

ID -- VDS
Tc=25°C
4.5V
10V
8V
6V
VGS=3.5V
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT16817

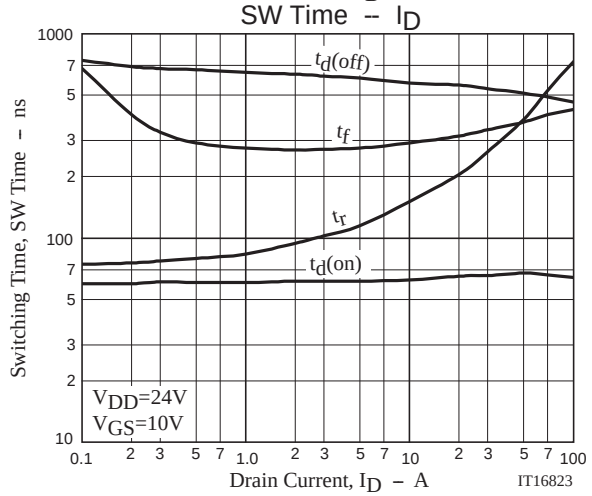

ID -- VGS
VDS=10V
Tc= –25°C
25°C
75°C
Tc=75°C
25°C
–25°C
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT16818

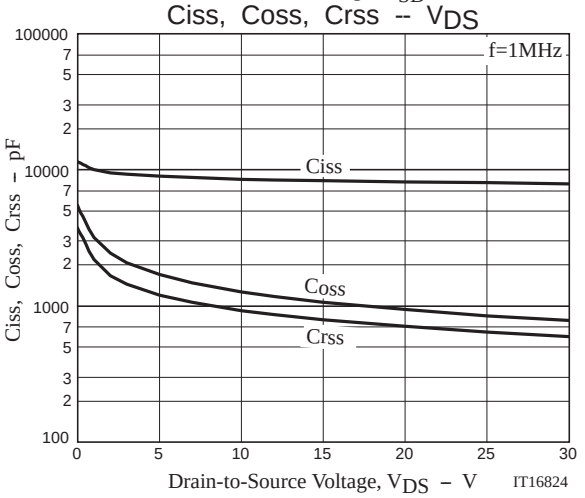

RDS(on) -- VGS
ID=50A
Single pulse
Tc=75°C
25°C
–25°C
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT16819

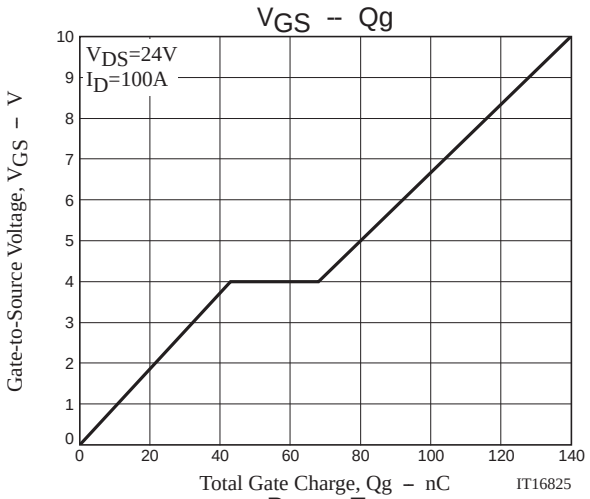

RDS(on) -- Tc
Single pulse
VGS=4.5V, ID=50A
VGS=10V, ID=50A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Case Temperature, Tc – °C
IT16820

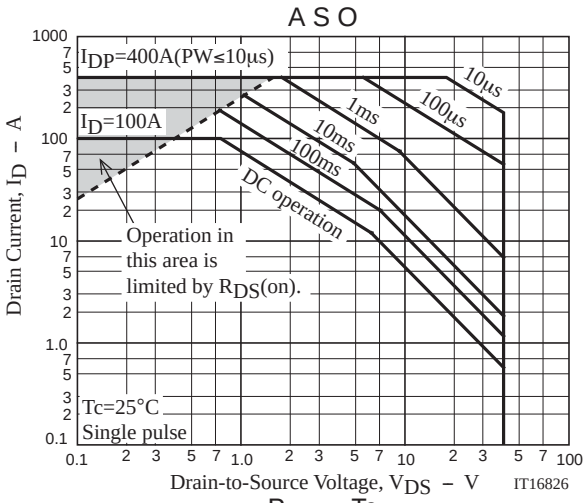

| yfs | -- ID
VDS=10V
25°C
Tc= –25°C
75°C
Forward Transfer Admittance, | yfs | – S
Drain Current, ID – A
IT16821

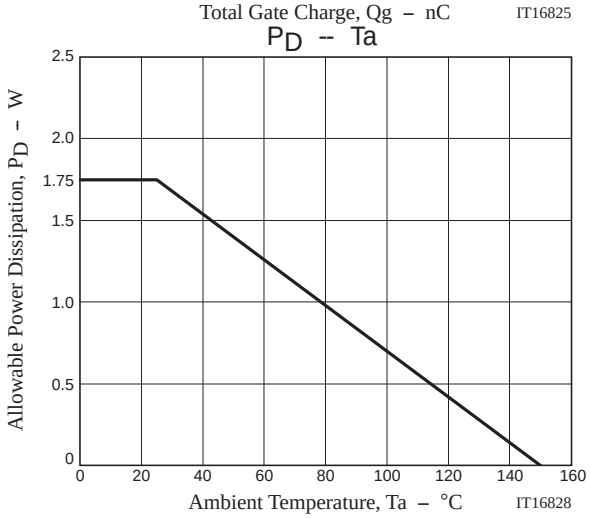

IS -- VSD
VGS=0V
Single pulse
Tc=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT16822

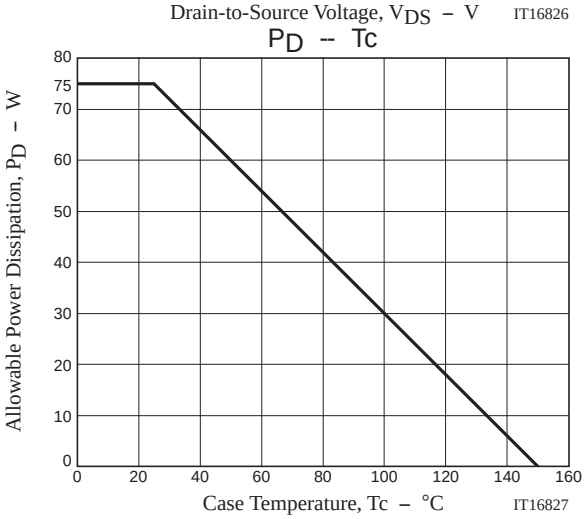

SW Time -- ID
td(off)
tf
tr
td(on)
VDD=24V
VGS=10V
Switching Time, SW Time – ns
Drain Current, ID – A
IT16823

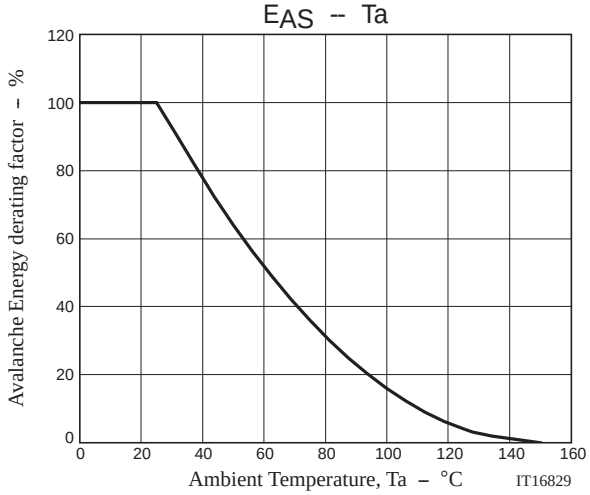

Ciss, Coss, Crss -- VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT16824


VGS -- Qg
VDS=24V
ID=100A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT16825


A S O
IDP=400A(PW≤10μs)
ID=100A
10μs
100μs
1ms
10ms
100ms
DC operation
Operation in
this area is
limited by RDS(on).
Tc=25°C
Single pulse
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT16826


PD -- Ta
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT16828


PD -- Tc
Allowable Power Dissipation, PD – W
Case Temperature, Tc – °C
IT16827


EAS -- Ta
Avalanche Energy derating factor – %
Ambient Temperature, Ta – °C
IT16829

**Magazine Specification**

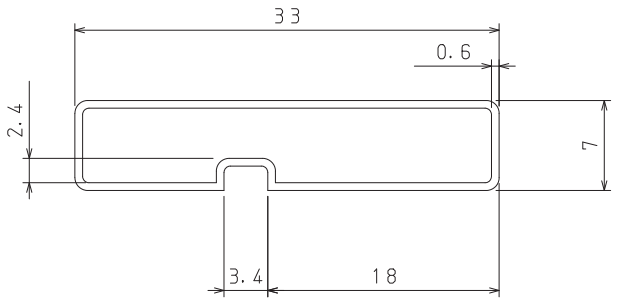
BXL4004-1E

## 1. Packing Format

| Package Name | Maximum Number of devices contained (pcs) | | | Packing format | |
|---|---|---|---|---|---|
| | Magazine | Inner box | Outer box | Inner BOX | Outer BOX |
| TO-220-3L | 50 | 1,000 | 4000 | SPD-0V0001<br>20 magazines contained<br>Dimensions:mm(external)<br>568×150×55 | SPD-LV0010<br>4 inner boxes contained<br>Dimensions:mm(external)<br>590x225x178 |

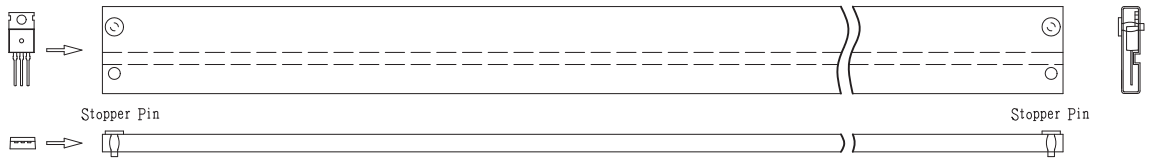
## 2. Magazine dimensions

(unit:mm)

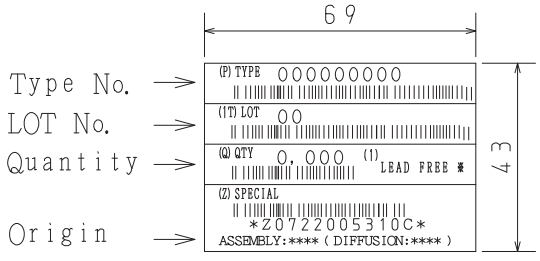



Tolerance=±0.2mm
Thickness=0.6+0.2/-0mm
Length =512.6±1mm
Material =PVC(Antistatic treatment)

## 3. Storage method to magazine

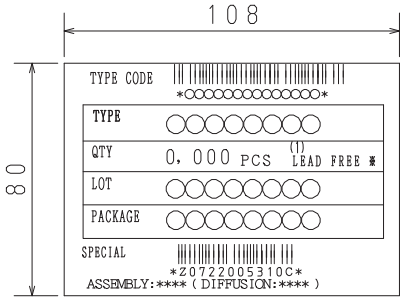



## 4. Inner box label (unit:mm)




## 5. Outer box label (unit:mm)

It is a label at the time of factory shipments.
The form of a label may change in physical distribution process.



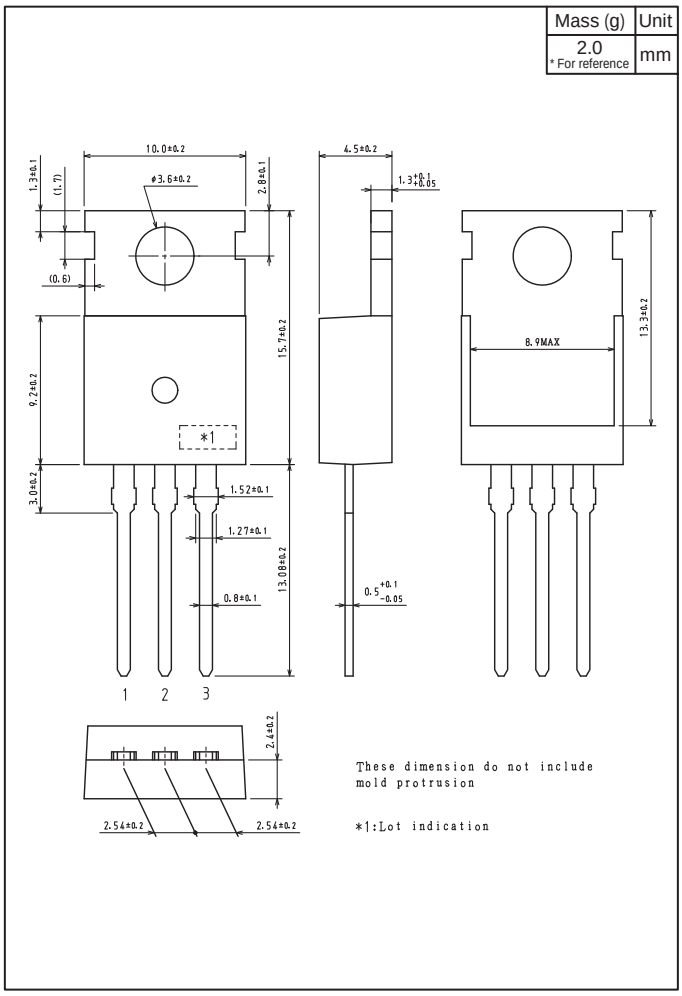

NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

| Label | JEITA Phase |
|---|---|
| LEAD FREE 3 | JEITA Phase 3A |

## Outline Drawing

BXL4004-1E

| Mass (g) | Unit |
|---|---|
| 2.0 * For reference | mm |



Note on usage : Since the BXL4004 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.