Ordering number : ENA0777C

2SK4099LS

N-Channel Power MOSFET
600V, 8.5A, 0.94Ω, TO-220F-3FS

ON Semiconductor®
http://onsemi.com

Features

- ON-resistance $R_{DS}(on)$=0.72Ω (typ.)
- 10V drive
- Input capacitance Ciss=750pF

Specifications

Absolute Maximum Ratings at Ta=25°C

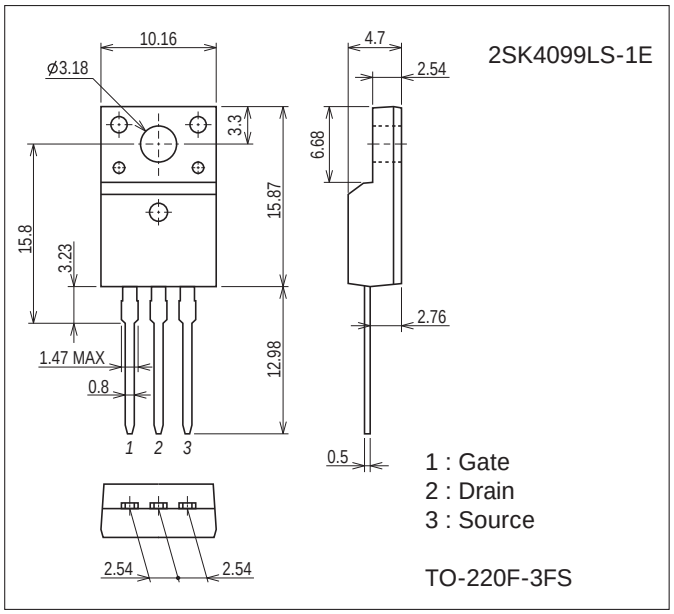
Parameter	Symbol	Conditions	Ratings	Unit
Drain to Source Voltage	V_{DSS}		600	V
Gate to Source Voltage	V_{GSS}		±30	V
Drain Current (DC)	I_{Dc}*1	Limited only by maximum temperature Tch=150°C	8.5	A
	I_{Dpack}*2	Tc=25°C (Our ideal heat dissipation condition)*3	6.9	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	34	A
Allowable Power Dissipation	P_D		2.0	W
		Tc=25°C (Our ideal heat dissipation condition)*3	35	W
Channel Temperature	Tch		150	°C
Storage Temperature	Tstg		−55 to +150	°C
Avalanche Energy (Single Pulse) *4	E_{AS}		197	mJ
Avalanche Current *5	I_{AV}		8.5	A

Note :*1 Shows chip capability
*2 Package limited
*3 Our condition is radiation from backside.
The method is applying silicone grease to the backside of the device and attaching the device to water-cooled radiator made of aluminium.
*4 V_{DD}=50V, L=1mH, I_{AV}=8.5A (Fig.1)
*5 L≤5mH, 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

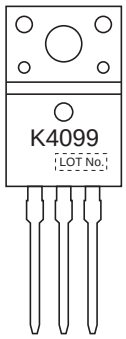
unit : mm (typ)
7528-001



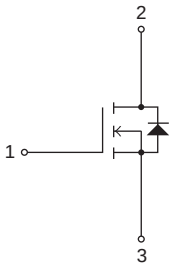
Ordering & Package Information

Device	Package	Shipping	memo
2SK4099LS-1E	TO-220F-3FS, SC-67	50pcs./tube	Pb-Free

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=10mA, V_{GS}=0V	600			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=480V, V_{GS}=0V			100	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V			±100	nA
Cutoff Voltage	V_{GS}(off)	V_{DS}=10V, I_D=1mA	3		5	V
Forward Transfer Admittance	| yfs |	V_{DS}=10V, I_D=4A	2.7	5.4		S
Static Drain to Source On-State Resistance	R_{DS}(on)	I_D=4A, V_{GS}=10V		0.72	0.94	Ω
Input Capacitance	Ciss	V_{DS}=30V, f=1MHz		750		pF
Output Capacitance	Coss			140		pF
Reverse Transfer Capacitance	Crss			31		pF
Turn-ON Delay Time	t_d(on)	See Fig.2		16		ns
Rise Time	t_r			37		ns
Turn-OFF Delay Time	t_d(off)			106		ns
Fall Time	t_f			41		ns
Total Gate Charge	Qg	V_{DS}=200V, V_{GS}=10V, I_D=8.5A		29		nC
Gate to Source Charge	Qgs			5.2		nC
Gate to Drain “Miller” Charge	Qgd			16.5		nC
Diode Forward Voltage	V_{SD}	I_S=8.5A, V_{GS}=0V		0.9	1.2	V

Fig.1 Unclamped Inductive Switching Test Circuit

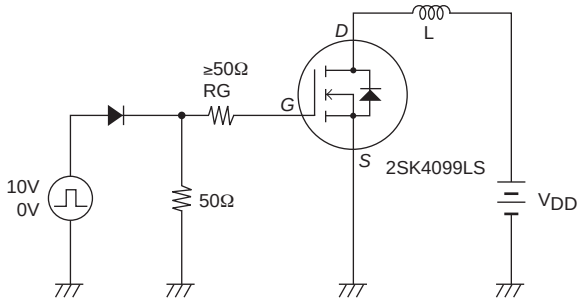
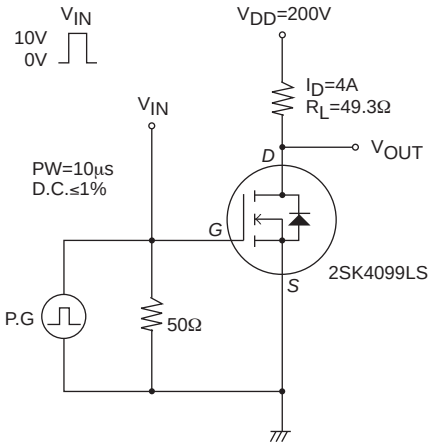
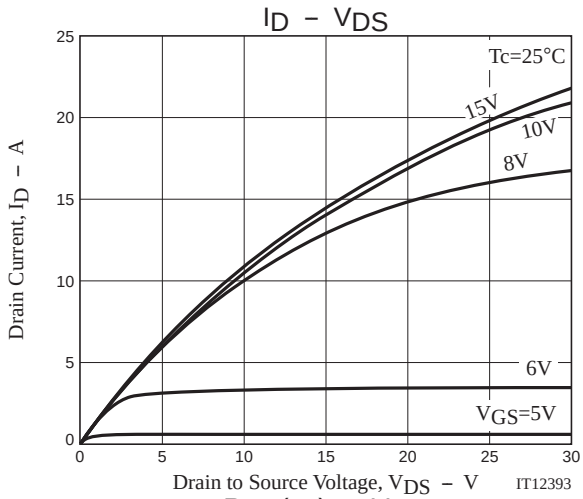
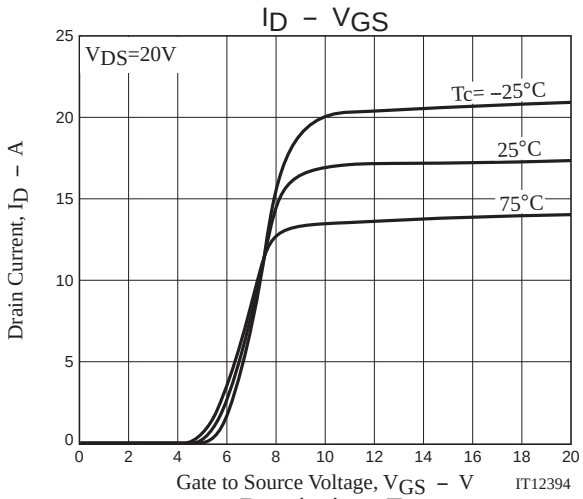
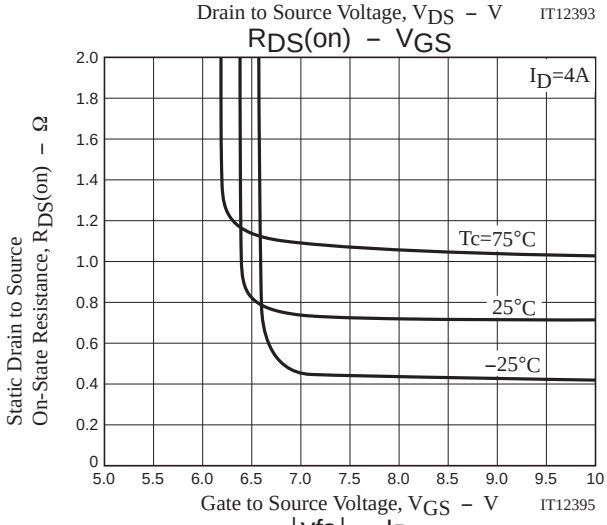


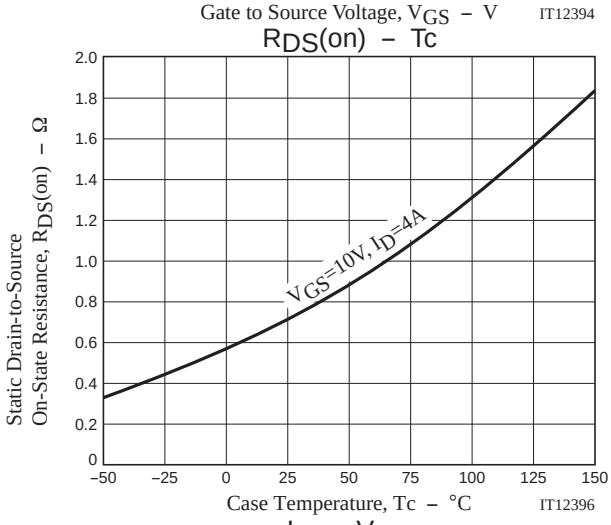
Fig.2 Switching Time Test Circuit

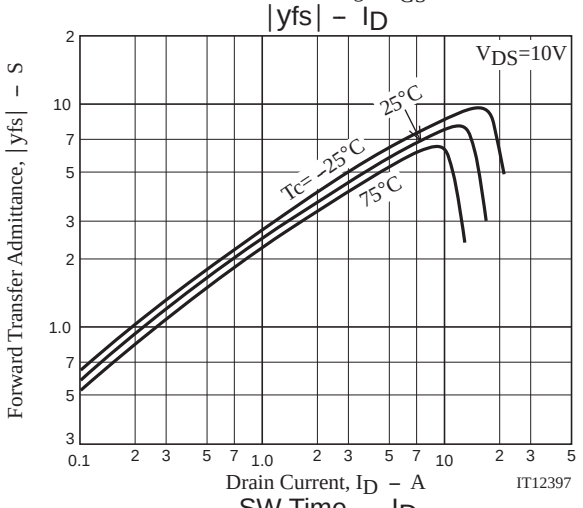


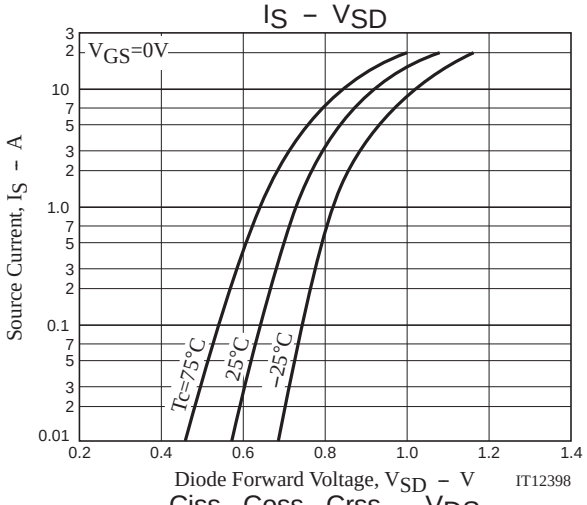

ID – VDS
Tc=25°C
15V
10V
8V
6V
VGS=5V
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT12393

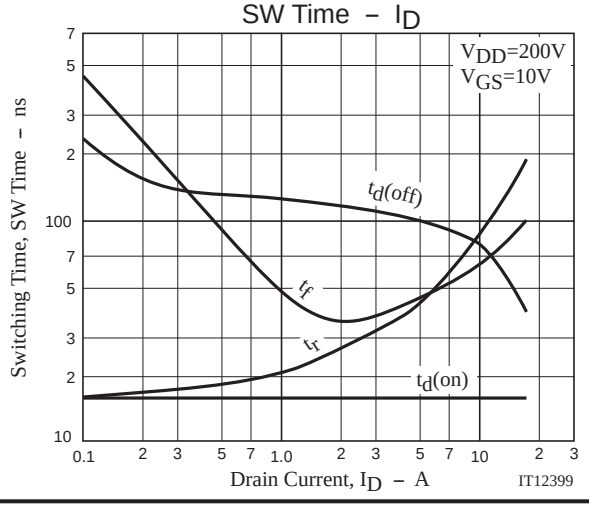

ID – VGS
VDS=20V
Tc= –25°C
25°C
75°C
Drain Current, ID – A
Gate to Source Voltage, VGS – V
IT12394

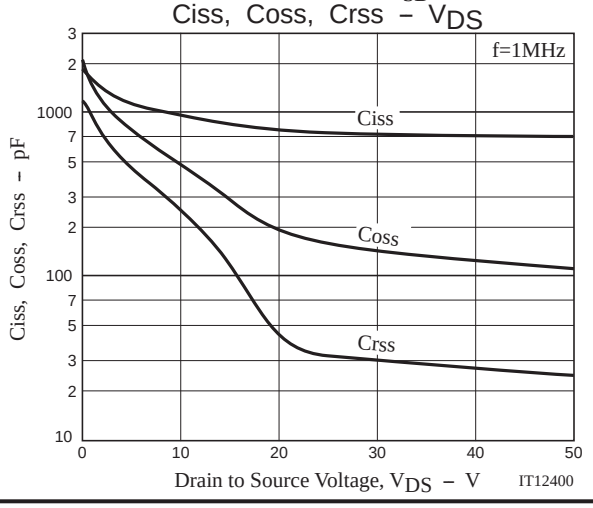

RDS(on) – VGS
ID=4A
Tc=75°C
25°C
–25°C
Static Drain to Source On-State Resistance, RDS(on) – Ω
Gate to Source Voltage, VGS – V
IT12395

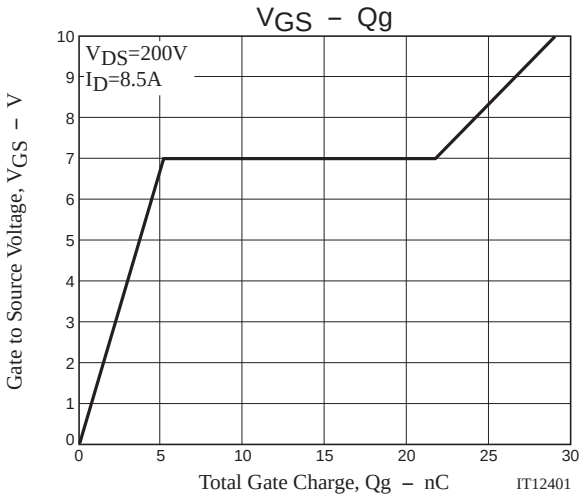

RDS(on) – Tc
VGS=10V, ID=4A
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Case Temperature, Tc – °C
IT12396

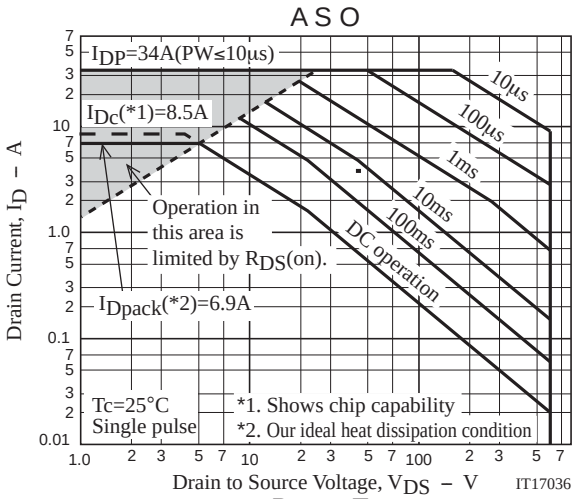

|yfs| – ID
VDS=10V
25°C
Tc= –25°C
75°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT12397

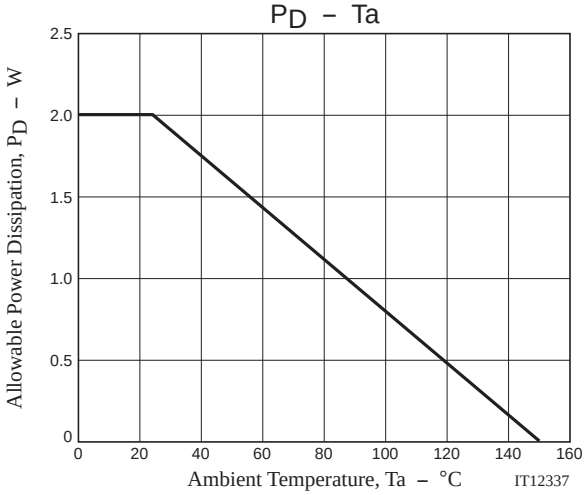

IS – VSD
VGS=0V
Tc=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT12398

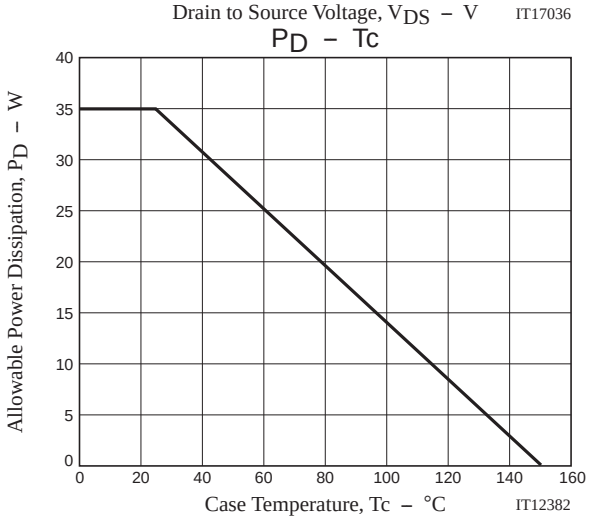

SW Time – ID
VDD=200V
VGS=10V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT12399

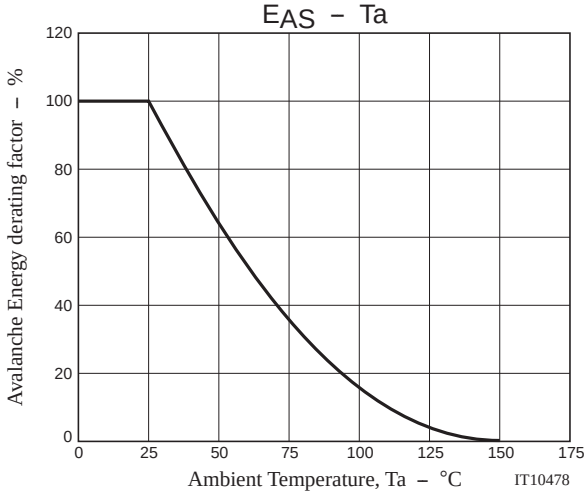

Ciss, Coss, Crss – VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT12400


VGS – Qg
VDS=200V
ID=8.5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT12401


A S O
IDP=34A(PW≤10μs)
IDc(*1)=8.5A
IDpack(*2)=6.9A
10μs
100μs
1ms
10ms
100ms
DC operation
Operation in this area is limited by RDS(on).
Tc=25°C
Single pulse
*1. Shows chip capability
*2. Our ideal heat dissipation condition
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT17036


PD – Ta
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT12337


PD – Tc
Allowable Power Dissipation, PD – W
Case Temperature, Tc – °C
IT12382


EAS – Ta
Avalanche Energy derating factor – %
Ambient Temperature, Ta – °C
IT10478

Magazine Specification

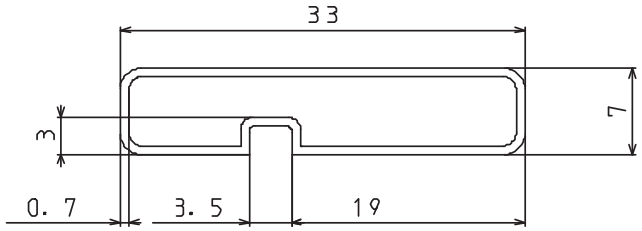
2SK4099LS-1E

1. Packing Format

Package Name	Magazine Name	Maximum Number of devices contained (pcs)			Packing format	
		Magazine	Inner box	Outer box	Inner BOX	Outer BOX
TO-220F-3FS	TO-220F	50	1,000	4,000	SPD-0V0001 20 magazines contained Dimensions:mm (external) 568×150×55	SPT-081029 4 inner boxes contained Dimensions:mm (external) 590×225×178

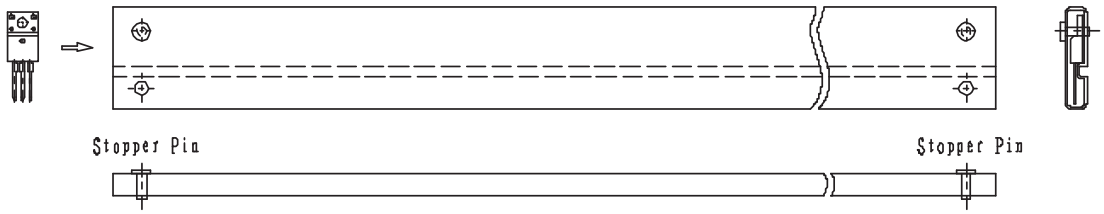
2. Magazine dimensions

(unit:mm)

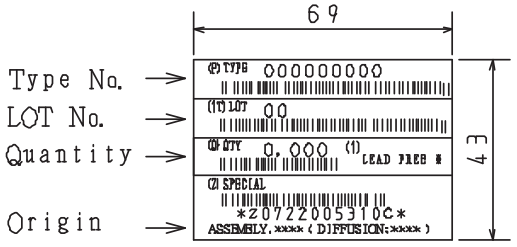


Tolerance=±0.3mm
Thickness=0.7±0.2mm
Length =532.5±2mm
Material =PVC (Antistatic treatment)

3. Storage method to magazine

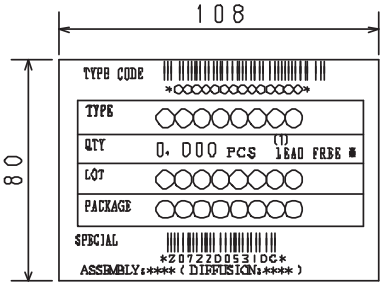


4. Inner box label (unit:mm)



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.

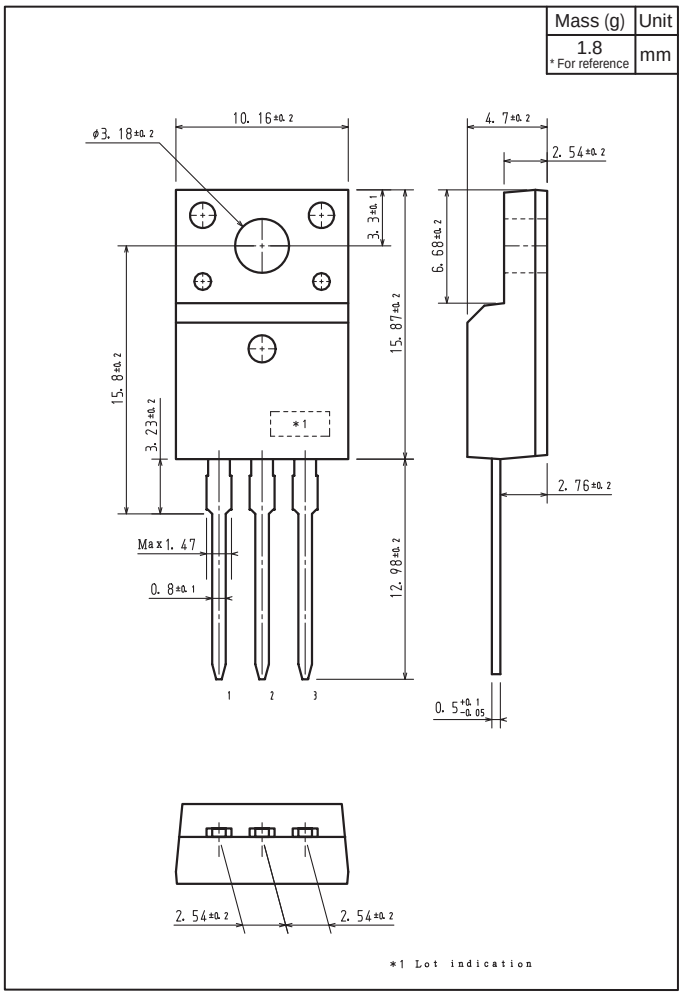


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A

Outline Drawing

2SK4099LS-1E



Note on usage : Since the 2SK4099LS is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.