

SuperMOS –TO-252 100V BV_{DSS}, 7.1mΩ R_{DS(ON)}, N-channel MOSFET

1. Description

The ESEP0178AK is N-Channel enhancement MOS Field Effect Transistor. Using advanced technology and design to provide excellent R_{DS(ON)} with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ESEP0178AK is Pb-free.

2. Features

- 100V, R_{DS(ON)}=7.1mΩ(TYP.) @V_{GS}=10V
- High density cell design for low R_{DS(on)}
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

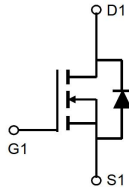
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ESEP0178AK	TO-252	GNQ10R08/LOT	Halogen free	Tape & Reel	2,500 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate	Note b 	
3	Source		
2	Drain		

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		BV_{DSS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	83	A
	$T_C=75^{\circ}\text{C}$		64	
Maximum Power Dissipation		P_D	96	W
Pulsed Drain Current		I_{DM}	332	A
Avalanche Current, Single Pulsed ^a		I_{AS}	23	A
Avalanche Energy, Single Pulsed ^a		E_{AS}	132	mJ
Operating Junction Temperature		T_J	150	°C
Lead Temperature		T_L	260	°C
Storage Temperature Range		T_{stg}	-55 to 150	°C

Thermal resistance ratings

Single Operation				
Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Case Thermal Resistance	$R_{\theta JC}$		1.3	°C/W

Note:

a: $T_J=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$.

b: This diagram is only an electrical schematic, and the actual pin size is based on POD.

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	100			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	2.0	3.0	4.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =30A		7.1	8.0	mΩ
Forward transconductance	g _{fs}	V _{DS} =5V, I _D =30A		65		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =50V		1895		pF
Output Capacitance	C _{OSS}			575		
Reverse Transfer Capacitance	C _{RSS}			12		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =10V, V _{DS} =50V, I _D =30A		28.5		nC
Gate-to-Source Charge	Q _{GS}			10		
Gate-to-Drain Charge	Q _{GD}			4.2		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =50V, I _D =30A, R _G =3Ω		17		ns
Rise Time	t _r			20		
Turn-Off Delay Time	t _{d(OFF)}			68		
Fall Time	t _f			21		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =30A		0.9	1.5	V

7. Typical Characteristic

Figure 1.On-Region Characteristics

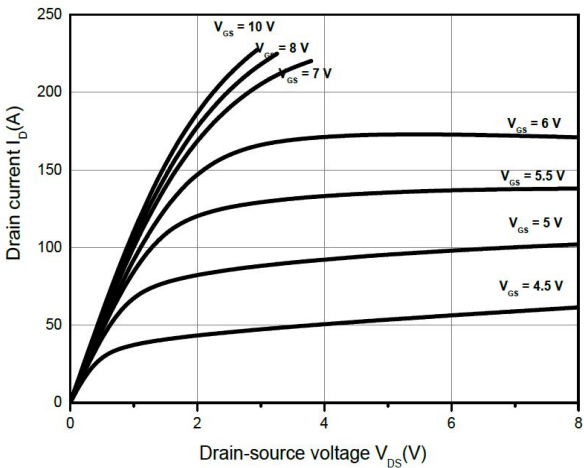


Figure 2.Transfer Characteristics

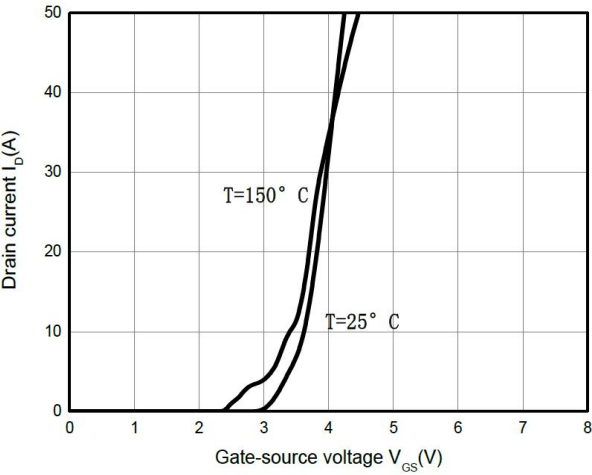


Figure 3.Body-Diode Characteristics

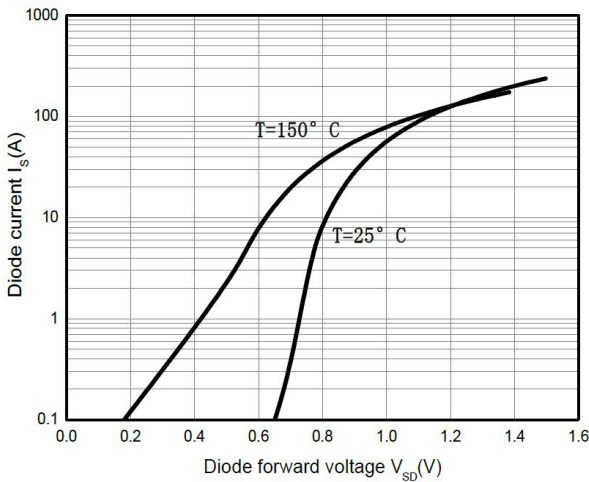


Figure 4.On-Resistance Variation vs.Drain Current

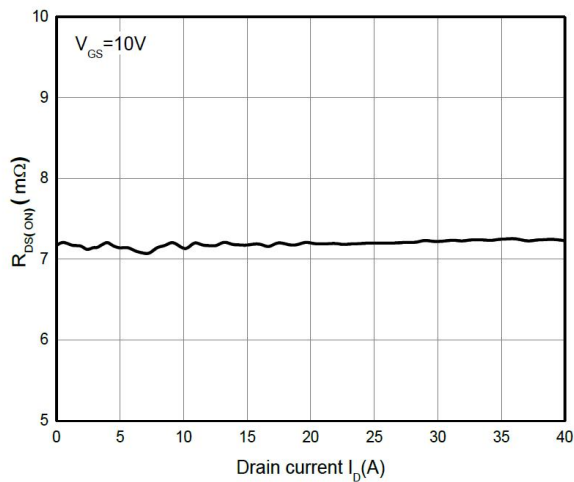


Figure 5.Rds(on) vs. Gate Voltage

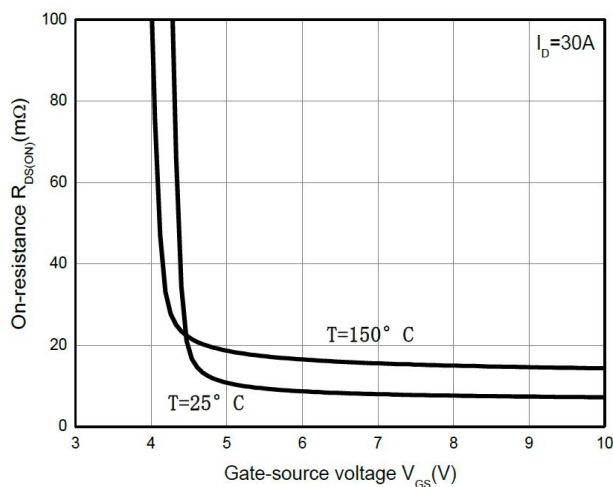


Figure 6.On-Resistance vs.Temperature

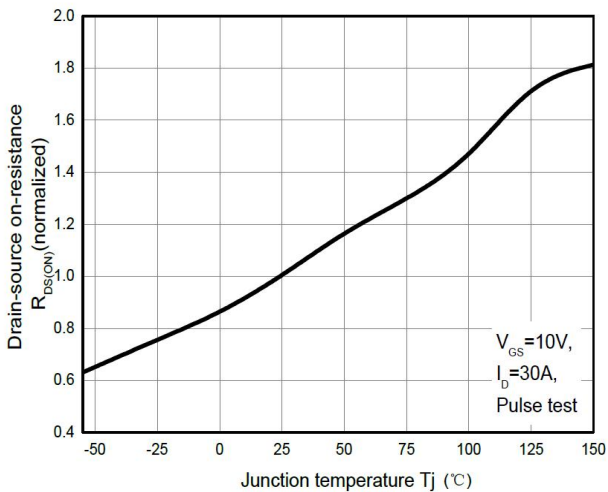


Figure 7.Threshold Voltage vs.Temperature

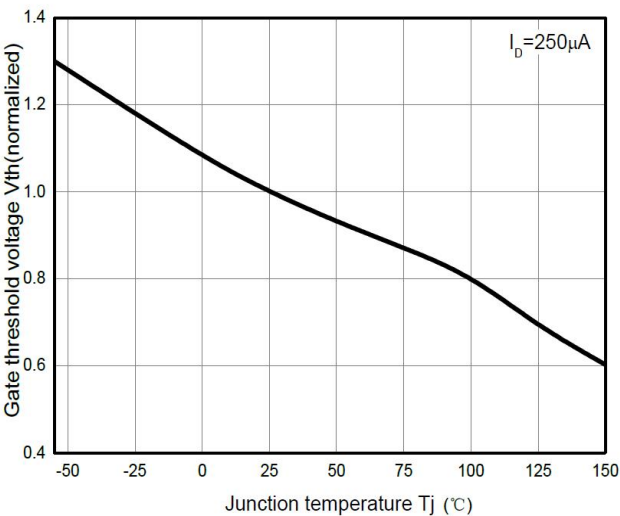


Figure 8.Breakdown Voltage vs.Temperature

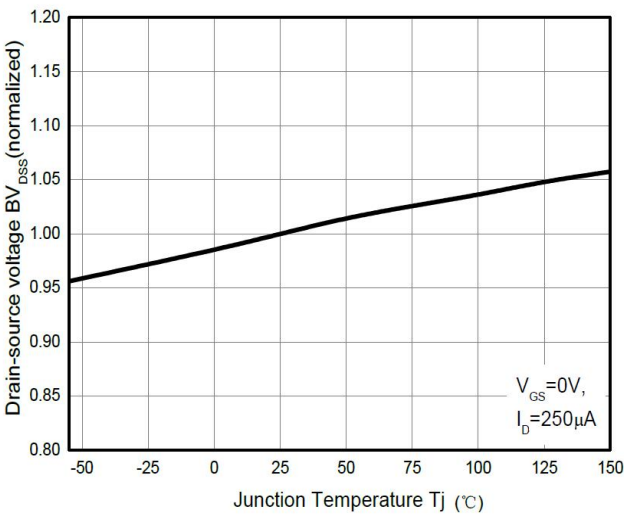


Figure 9.Capacitance Characteristics

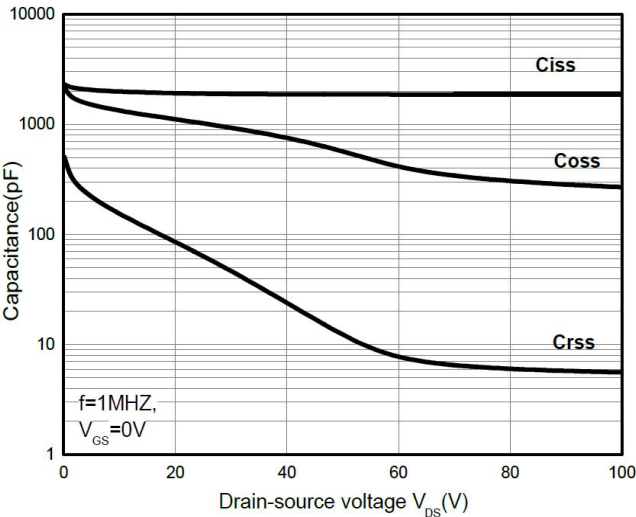


Figure 10.Gate Charge Characteristics

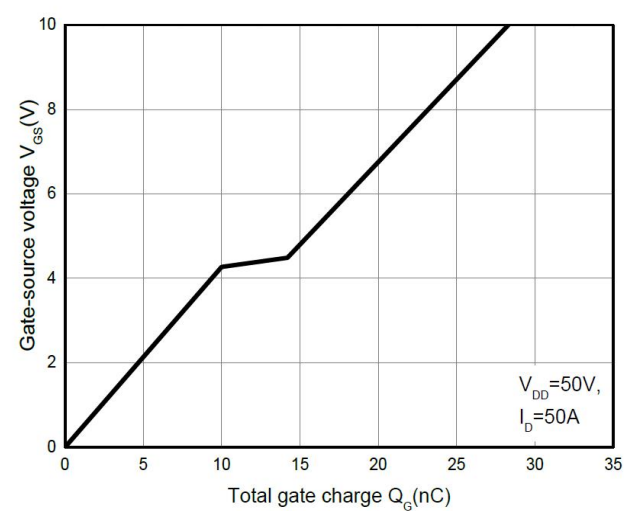


Figure 11.Drain Current Derating

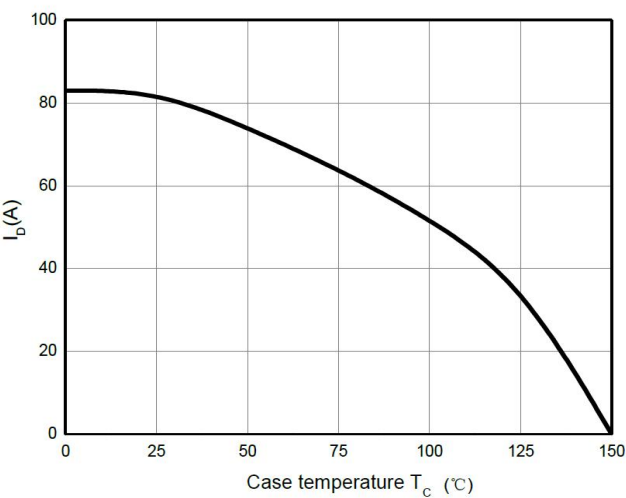


Figure 12.Power Dissipation vs.Temperature

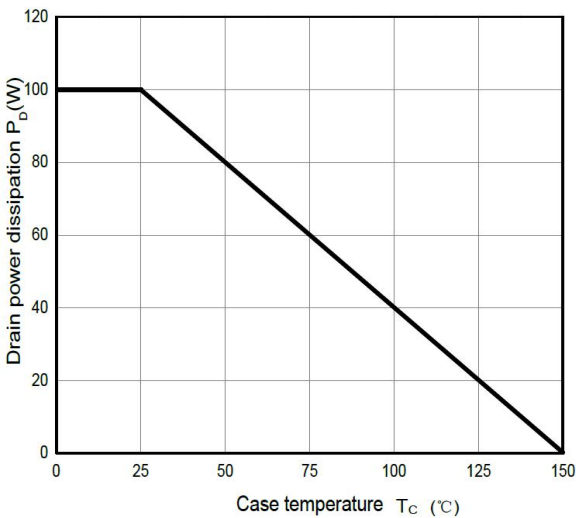


Figure 13.Maximum Safe Operating Area

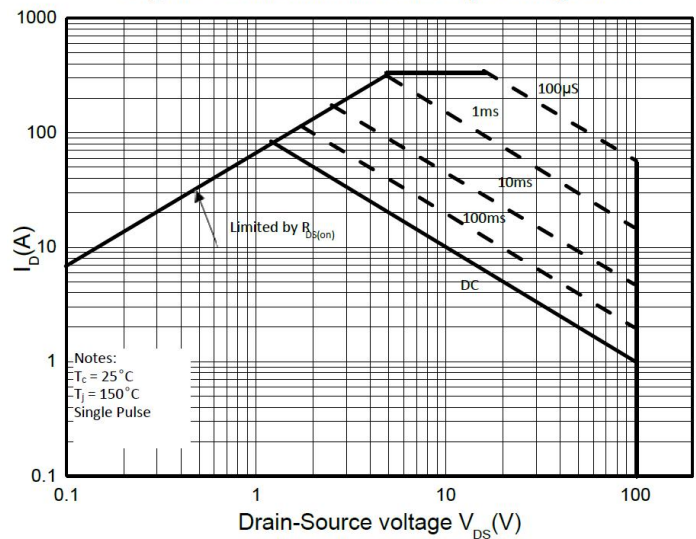
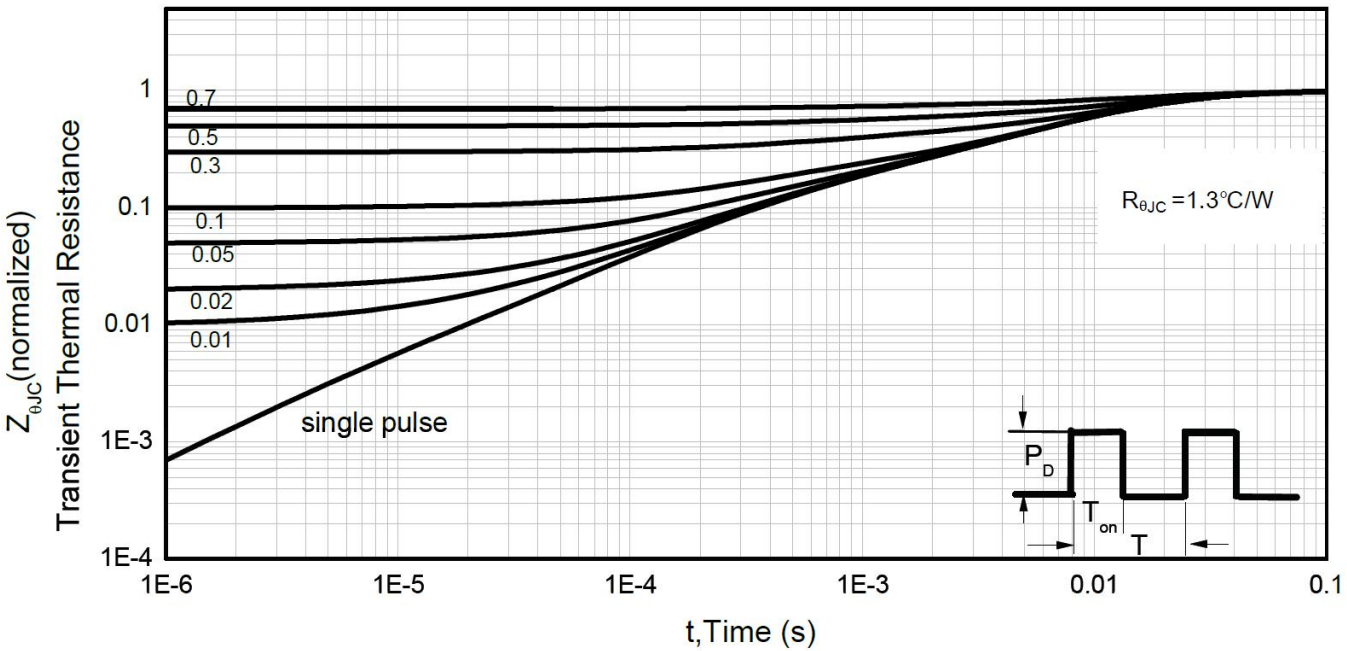
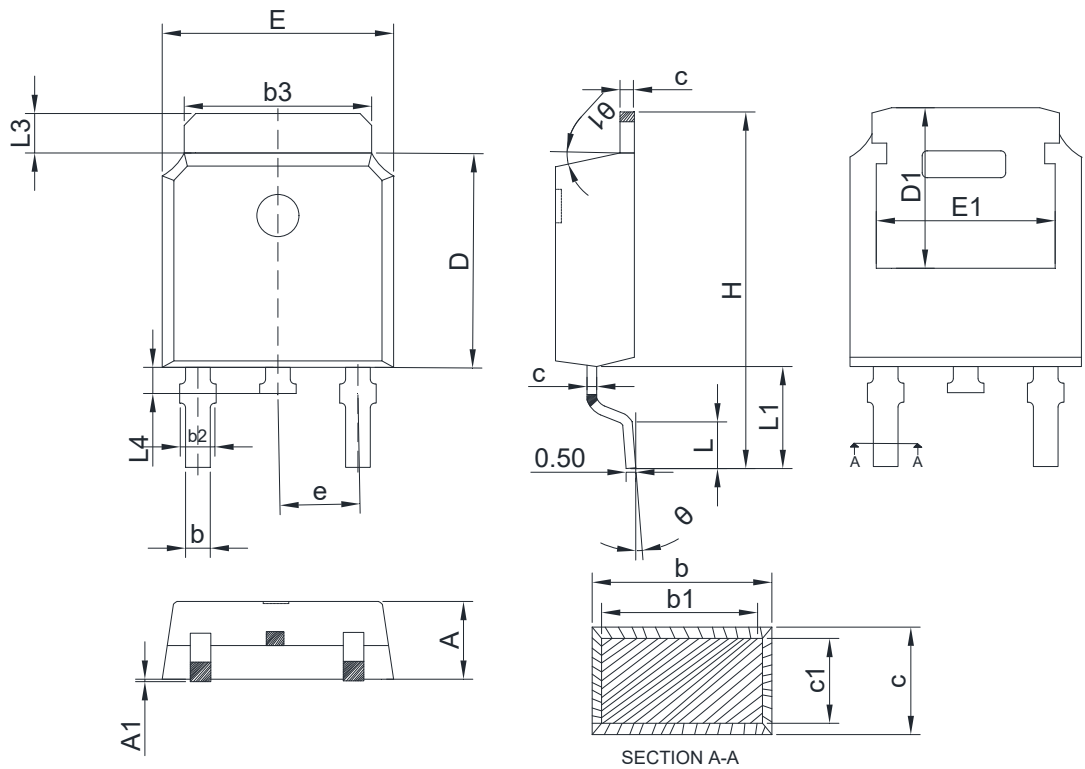


Figure 14. Normalized Maximum Transient Thermal Impedance (R_{thJC})



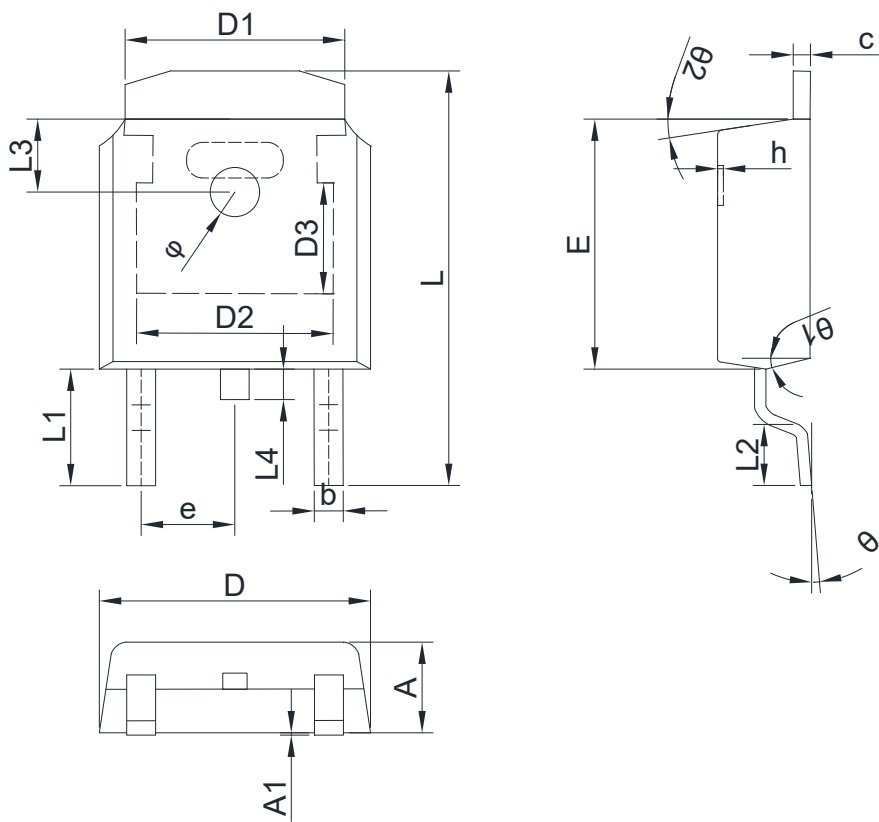
8. Dimension (TO-252)

POD A



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	2.20	2.30	2.40	D1	5.21	-	-
A1	0.00	-	0.12	E	6.50	6.60	6.70
b	0.65	-	0.89	E1	4.32	-	-
b1	0.64	0.76	0.79	H	9.70	9.95	10.20
b2	0.76	0.86	1.10	L	1.40	1.50	1.60
b3	5.20	5.33	5.46	L1	2.84REF		
c	0.48	-	0.60	e	2.29BSC		
c1	0.47	0.51	0.55	θ	0°	-	10°
D	6.00	6.10	6.20	$\theta 1$	0°	-	15°
L3	0.90	-	1.27	L4	0.60	0.80	1.00

POD B



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	2.200	2.300	2.400	h	0.000	0.100	0.200
A1	0.000		0.127	L	9.900	10.100	10.300
b	0.640	0.690	0.740	L1	2.888 REF		
c(电镀后)	0.460	0.520	0.580	L2	1.400	1.550	1.700
D	6.500	6.600	6.700	L3	1.600 REF		
D1	5.334 REF			L4	0.600	0.800	1.000
D2	4.826 REF			φ	1.100	1.200	1.300
D3	3.166 REF			θ	0°		8°
E	6.000	6.100	6.200	θ1	9° TYP		
e	2.286 TYP			θ2	9° TYP		

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