KODENSHI AUK

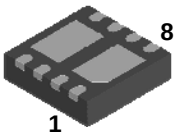
SUM202MN

P-Channel MOSFET + PNP BJT

Integrated Power MOSFET with PNP Low $V_{CE(sat)}$ Switching Transistor

This integrated device represents a new level of safety and board−space reduction by combining the 20V P−Channel FET with a PNP Silicon Low VCE(sat) switching transistor. This newly integrated product provides higher efficiency and accuracy for battery powered portable electronics.

DFN-8



MOSFET

BV_{DSS}	$R_{DS(ON)}$ Typ.	I_D Max
-20V	48mΩ @ VGS=-4.5V	-5.3A
	65mΩ @ VGS=-2.5V	

PNP BJT

BV_{CEO}	BV_{EBO}.	I_C Max
-12V	-5V	-5A

Features

- Low RDS(on) (MOSFET) and Low VCE(sat) (Transistor)
- Higher Efficiency Extending Battery Life
- Logic Level Gate Drive (MOSFET)
- Performance DFN Package
- This is a Halogen−Free Device

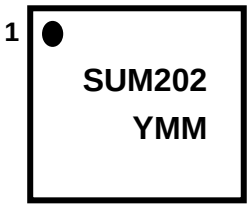
Applications

- Power Management in Portable and Battery−Powered Products; i.e., Cellular and Cordless Telephones and PCMCIA Cards

Ordering Information

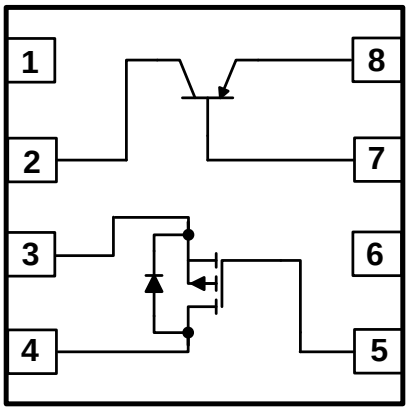
Device	Marking	Package
SUM202MN	SUM202	DFN8

Marking Diagram

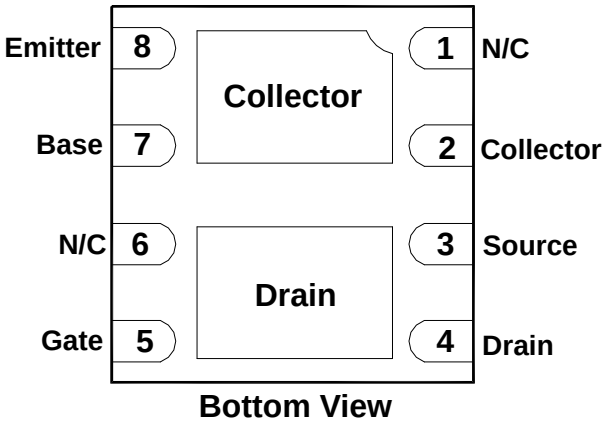


Column 1 : Device Code
Column 2 : Date Code (year, month)

Simple Schematic



PIN Connection



Bottom View

Absolute maximum ratings for P-Ch MOSFET (Ta=25°C)

Characteristic	Symbol		Rating		Unit
			5sec	Steady State	
Drain-source voltage	V_{DSS}		-20		V
Gate-source voltage	V_{GSS}		±12		V
Drain current (DC) (Note.1)	I_D	T_A=25℃	-5.3	-3.9	A
		T_A=85℃	-3.8	-2.8	A
Drain current (Pulsed)	I_{DP}		±20		A
Continuous Source current	I_S		-5.3	-3.9	A
Total Power dissipation (Note.1)	P_D	T_A=25℃	2.5	1.3	W
		T_A=85℃	1.3	0.7	W
Operating Junction and Storage Temperature Range	T_J , T_{stg}		-55 ~ 150		°C

Absolute maximum ratings for PNP Transistor (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base voltage	V_{CBO}	-15	V
Collector-Emitter voltage	V_{CEO}	-12	V
Emitter-Base voltage	V_{EBO}	-5	V
Collector current – continuous	I_C	-5	A
Peak Collector current	I_{CM}	-15	A

Thermal Characteristics for P-Ch MOSFET

Characteristic	Symbol	Condition	Typ.	Max.	Unit
Junction to Ambient (Note.5)	$R_{TH(J-A)}$	t≤ 5 sec	40	50	℃/W
		Steady State	80	95	
Junction to Foot (Drain)	$R_{TH(J-F)}$	Steady State	15	20	℃/W

Thermal Characteristics for PNP Transistor

Characteristic	Symbol	Max.	Unit
Total Device Dissipation	P_D (Note.2)	635	mW
Thermal Resistance, Junction to Ambient	$R_{TH(J-A)}$ (Note.2)	200	℃/W
Total Device Dissipation	P_D (Note.3)	1.35	W
Thermal Resistance, Junction to Ambient	$R_{TH(J-A)}$ (Note.3)	90	℃/W
Thermal Resistance, Junction to Lead #1	$R_{TH(J-L)}$	15	℃/W
Total Device Dissipation (Single Pulse < 10 sec)	$P_{Dsingle}$ (Note.3&4)	2.75	W
Junction and Storage Temperature Range	T_J, T_{stg}	-55 ~ 150	℃

1. Surface Mounted on FR4 Board using 1in square pad size (Cu area =1.27 in square [1 oz] including traces)
2. FR−4 @ 100 mm2, 1 oz copper traces.
3. FR−4 @ 500 mm2, 1 oz copper traces.
4. Thermal response.

Electrical Characteristics for P-Ch MOSFET (Ta=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static						
Drain-source breakdown voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0	-20	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=-250μA, V_{DS}=V_{GS}	-0.6		-1.2	V
Drain-source cut-off current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V	-	-	-1	μA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
On-State Drain Current (Note.6)	$I_{D(ON)}$	V_{DS}≤ -5.0V, V_{GS}=-4.5V	-20	-	-	A
Drain-source on-resistance (Note.6)	$R_{DS(ON)}$	V_{GS}=-3.6V, I_D=-1.0A	-	50	60	mΩ
		V_{GS}=-2.5V, I_D=-1.0A	-	70	83	
Forward transfer conductance (Note.6)	g_{fs}	V_{DS}=-10V, I_D=-3.9A	-	12	-	S
Diode Forward Voltage (Note.6)	V_{SD}	I_S=-2.1A, V_{GS}=0V	-	-0.8	-1.2	V
Dynamic (Note.7)						
Input capacitance	Ciss	V_{GS}=0V, V_{DS}=-5V, f=1MHz	-	710	-	pF
Output capacitance	Coss		-	400	-	
Reverse transfer capacitance	Crss		-	140	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-10V, I_D=-1.0A R_G=6Ω, R_D=10Ω V_{GS}=-4.5V	-	14	30	ns
Rise time	t_r		-	22	55	
Turn-off delay time	$t_{d(off)}$		-	42	100	
Fall time	t_f		-	35	70	
Total gate charge	Q_g	V_{DD}=-10V, V_{GS}=-4.5V I_D=-3.9A	-	9.7	22	nC
Gate-source charge	Q_{gs}		-	1.2	-	
Gate-drain charge	Q_{gd}		-	3.6	-	

5. Surface Mounted on FR4 Board using 1 inch square pad size (Cu area =1.27 inch square [1 oz] including traces).

6. Pulse Test : Pulse Width≤ 300us, Duty Cycle≤2%.

7. Guaranteed by design, not subject to production testing.

Electrical Characteristics for PNP Transistor (Ta=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
Collector-Base breakdown voltage	BV_{CBO}	I_C=-50μA, I_E=0	-15	-	-	V
Collector-Emitter breakdown voltage	BV_{CEO}	I_C=-1mA, I_B=0	-12	-	-	V
Emitter-Base breakdown voltage	BV_{EBO}	I_E=-50μA, I_C=0	-5	-	-	V
Collector cut-off current	I_{CBO}	V_{CB}=-15V, I_E=0	-	-	-1	μA
Emitter cut-off current	I_{EBO}	V_{EB}=-5V, I_C=0	-	-	-1	μA
On Characteristics						
DC current gain (Note.8)	h_{FE}*	V_{CE}=-2V, I_C=-500mA	160	-	320	-
Base-Emitter on voltage (Note.8)	$V_{BE(on)}$	V_{CE}=-2V, I_C=-500mA	-	-	-1	V
Collector-Emitter saturation voltage (Note.8)	$V_{CE(sat)}$	I_C=-3A, I_B=-150mA	-	-0.2	-0.5	V
Transition frequency	f_T	V_{CB}=-5V, I_C=-500mA	-	150	-	MHz
Collector output capacitance	C_{ob}	V_{CB}=-10V, I_E=0, f=1MHz	-	-	50	pF

8. Pulse Test : Pulse Width≤ 300us, Duty Cycle≤ 2%.

Electrical Characteristic Curves (P-Channel MOSFET)

Fig. 1 I_D - V_{DS}

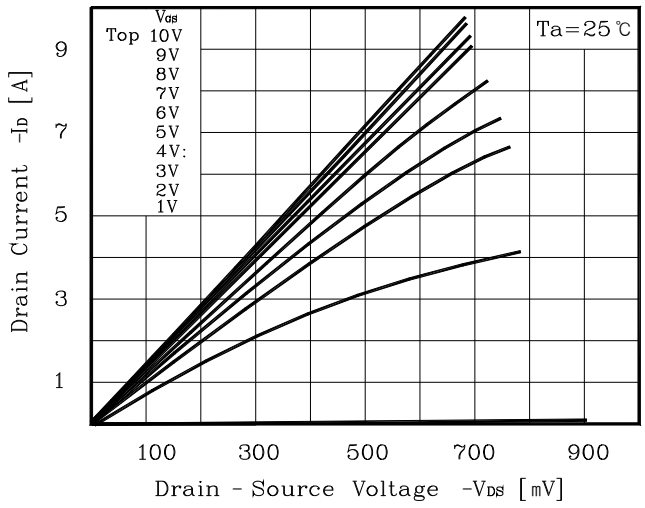


Fig. 2 I_D - V_{GS}

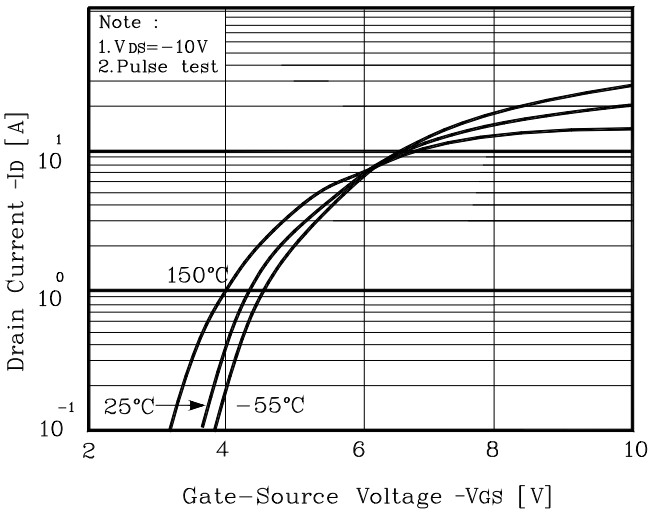


Fig. 3 $R_{DS(on)}$ - I_D

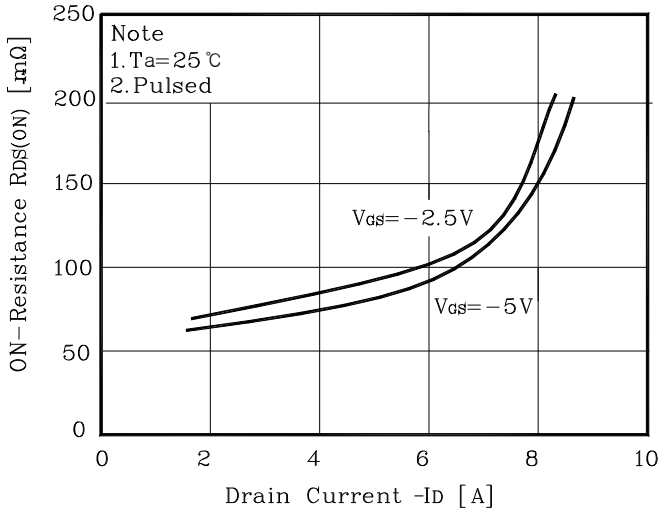


Fig. 4 I_S - V_{SD}

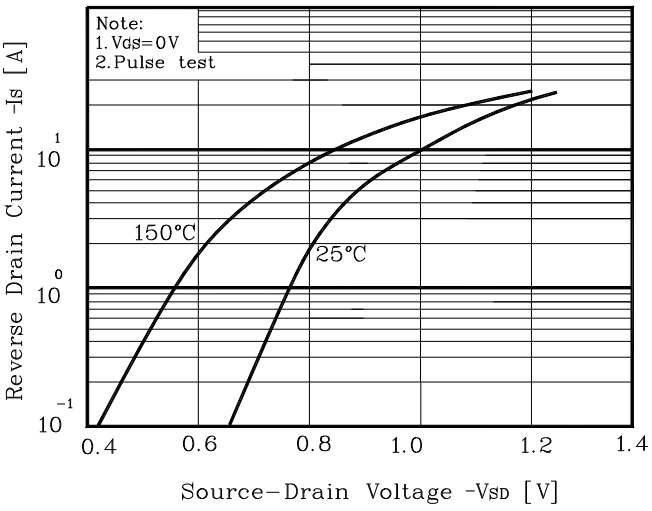


Fig. 5 Capacitance - V_{DS}

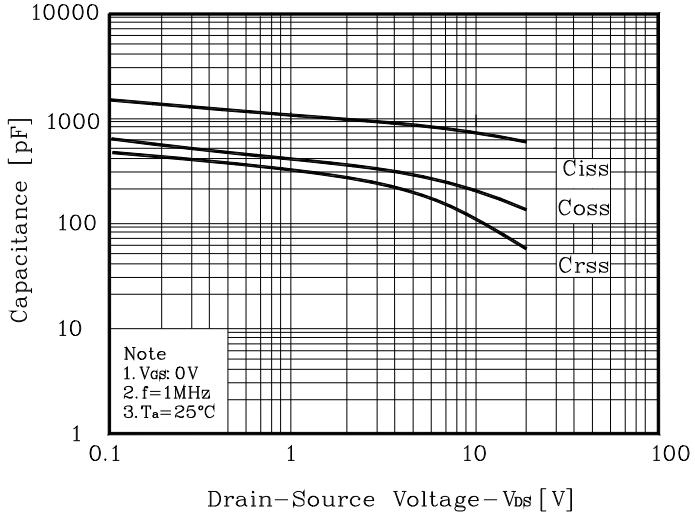
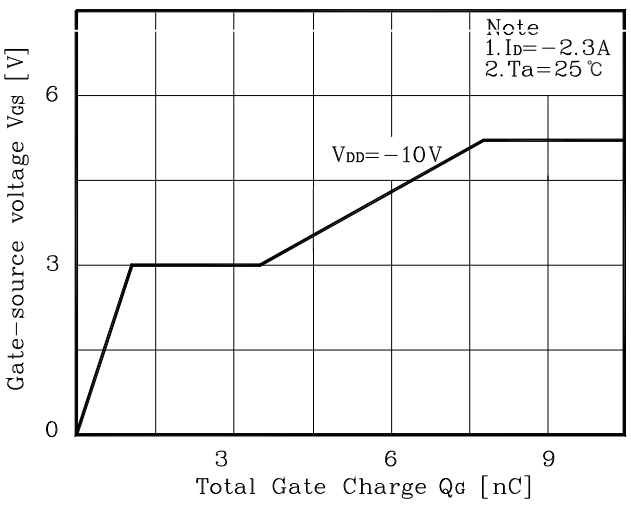


Fig. 6 V_{GS} - Q_G



Electrical Characteristics (P-Channel MOSFET)

Fig. 7 V_{DSS} - T_J

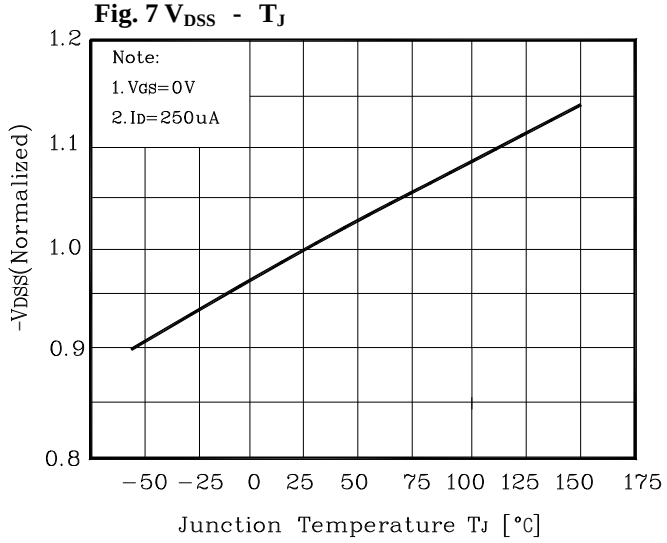


Fig. 8 $R_{DS(on)}$ - T_J

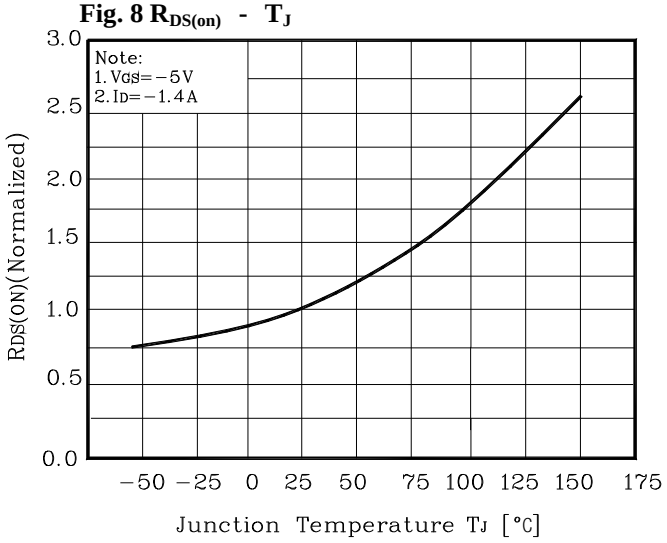
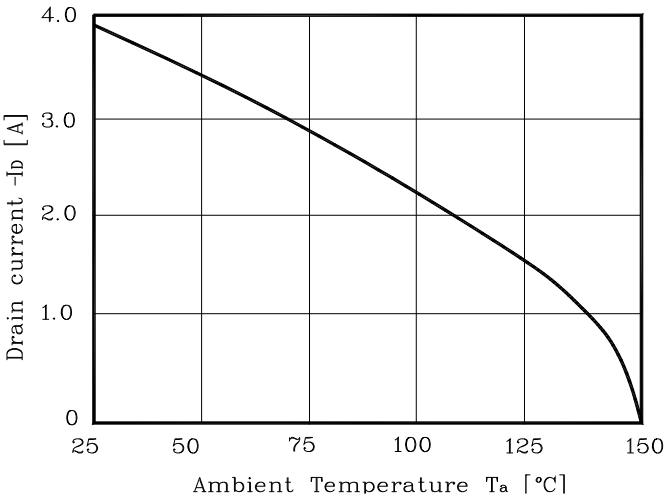


Fig. 9 I_D - T_a



Electrical Characteristic Curves (PNP BJT)

Fig. 1 Pc - Ta

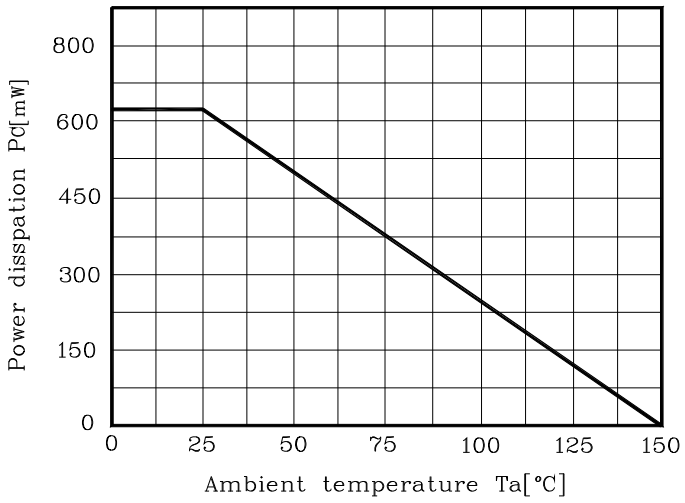


Fig. 2 Ic - V_{BE}

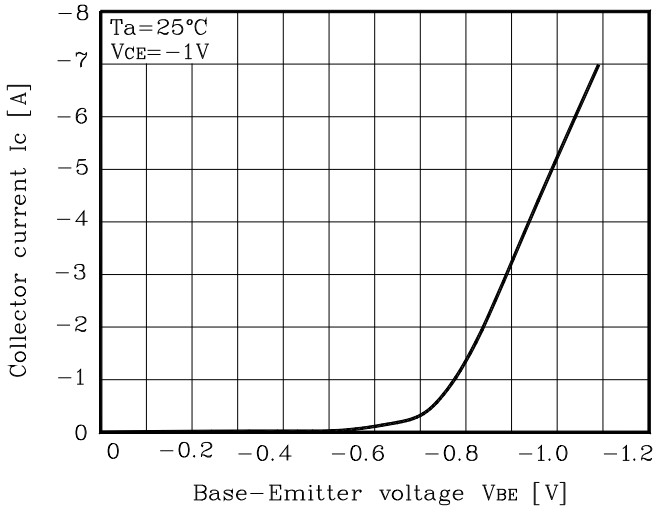


Fig. 3 h_{FE} - I_C

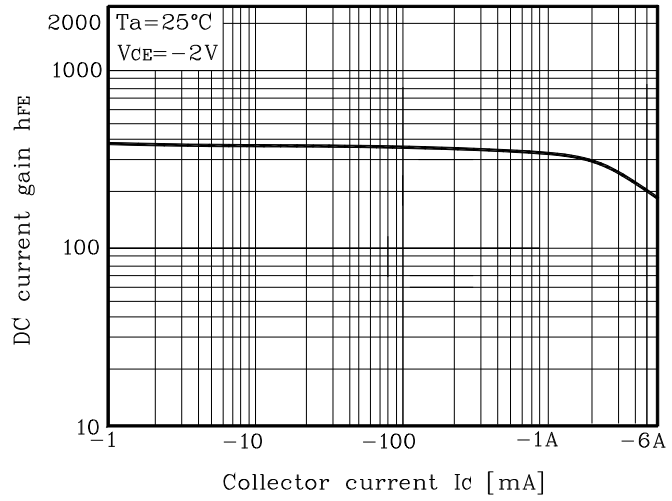
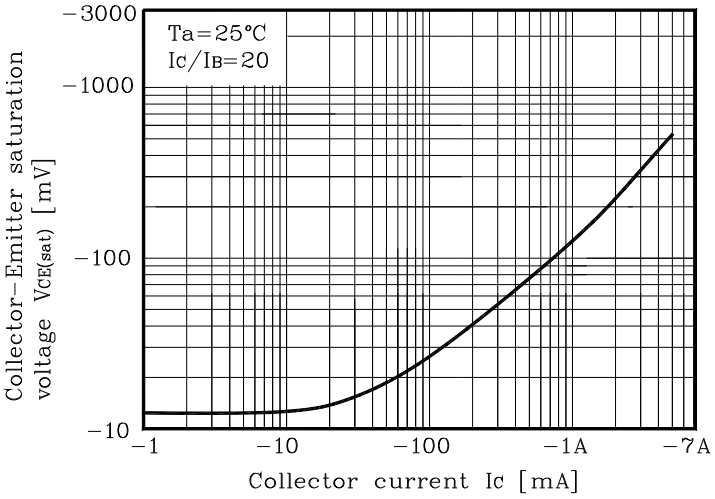
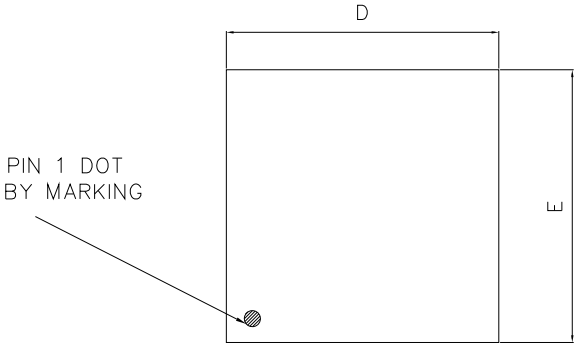


Fig. 4 $V_{CE(sat)}$ - I_C

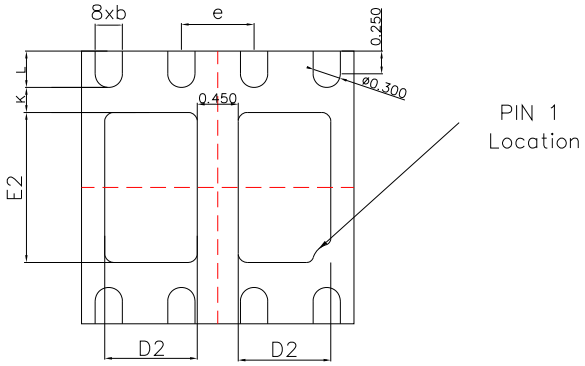


Outline Dimension

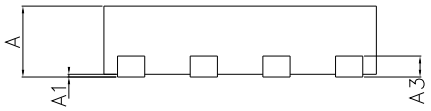
unit : mm



TOP VIEW



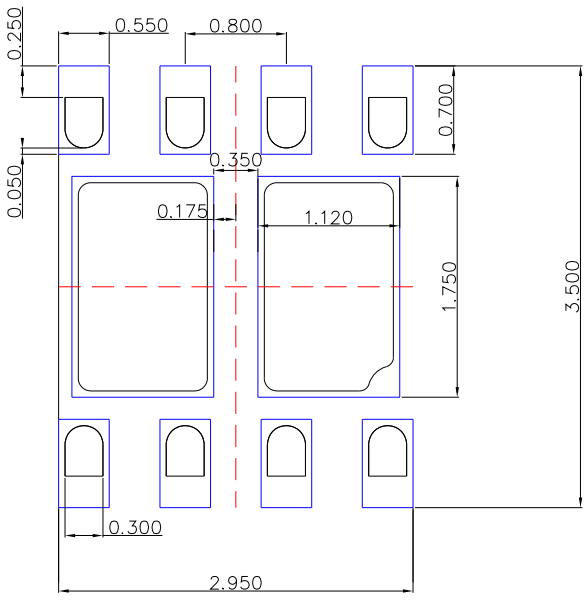
BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS(MM)			
PKG.	W: VERY VERY THIN		
REF.	MIN.	NOM.	MAX
A	0.70	0.75	0.80
A1	0.00	–	0.05
A3		0.20 REF.	
D	2.95	3.00	3.05
E	2.95	3.00	3.05
D2	0.87	1.02	1.12
E2	1.50	1.65	1.75
b	0.25	0.30	0.35
L	0.30	0.40	0.50
K		Min : 0.21	
e		0.80 BSC	

Recommended Land Pattern [unit: mm]



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