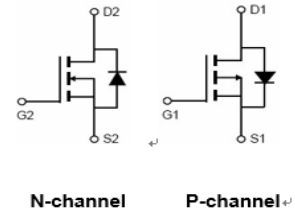


30V N+P-Channel Enhancement Mode MOSFET

Description

The AP5G03S/DF uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge .

The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications



General Features

N-Channel

$V_{DS} = 30V, I_D = 8A$
 $R_{DS(ON)} < 20m\Omega @ V_{GS}=10V$

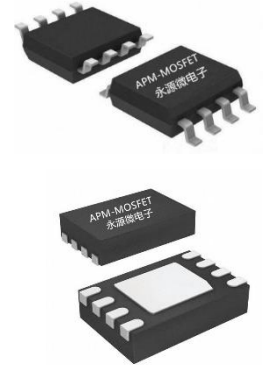
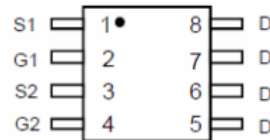
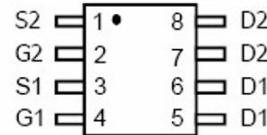
P-Channel

$V_{DS} = -30V, I_D = -6.2A$
 $R_{DS(ON)} < -50m\Omega @ V_{GS}=-10V$

Application

Power switching application
 Hard Switched and High Frequency Circuits
 Uninterruptible Power Supply

Schematic diagram



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP5G03S	SOP-8	AP5G03S XXX YYYY	3000
AP5G03DF	DFN3*3-8L	AP5G03DF XXX YYYY	5000

Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Drain Current – Continuous ($T_c=25^\circ C$)	8	-7.2	A
	Drain Current – Continuous ($T_c=100^\circ C$)	6	-5.5	A
I_{DM}	Drain Current – Pulsed ¹	35	-32	A
EAS	Single Pulse Avalanche Energy ^{2,6}	12	4	mJ
IAS	Single Pulse Avalanche Current ²	15	11	A
P_D	Power Dissipation ($T_c=25^\circ C$)	12		W
	Power Dissipation – Derate above $25^\circ C$	0.13		W/ $^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ C$

30V N+P-Channel Enhancement Mode MOSFET

T _J	Operating Junction Temperature Range	-55 to 150	°C
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Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction to ambient	---	52.5	°C/W
R _{θJC}	Thermal Resistance Junction to Case	---	5.8	°C/W

N-CH Electrical Characteristics (T_J=25 °C, unless otherwise)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =30V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =24V, V _{GS} =0V, T _J =125°C	---	---	10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =10A	---	18	20	mΩ
		V _{GS} =4.5V, I _D =6A	---	21	30	mΩ
V _{GS(th)}	Gate Threshold Voltage		0.9	1.1	2.2	V
V _{GS(th)}	V _{GS(th)} Temperature Coefficient	V _{GS} =V _{DS} , I _D =250uA	---	-4	---	mV/°C
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =6A	---	13	---	S
Q _g	Total Gate Charge ^{3, 4}	V _{DS} =15V, V _{GS} =4.5V, I _D =8A	---	4.1	6	nC
Q _{gs}	Gate-Source Charge ^{3, 4}		---	1	1.4	
Q _{gd}	Gate-Drain Charge ^{3, 4}		---	2.1	4	
T _{d(on)}	Turn-On Delay Time ^{3, 4}	V _{DD} =15V, V _{GS} =10V, R _G =6 I _D =1A	---	2.8	5	ns
T _r	Rise Time ^{3, 4}		---	7.2	14	
T _{d(off)}	Turn-Off Delay Time ^{3, 4}		---	15.8	30	
T _f	Fall Time ^{3, 4}		---	4.6	9	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, F=1MHz	---	345	500	pF
C _{oss}	Output Capacitance		---	55	80	
C _{rss}	Reverse Transfer Capacitance		---	32	55	
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	---	3.2	6.4	Ω
I _s	Continuous Source Current		---	---	12	A
I _{SM}	Pulsed Source Current	V _G =V _D =0V, Force Current	---	---	24	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _s =1A, T _J =25°C	---	---	1	V

Note :

- 1、Repetitive Rating : Pulsed width limited by maximum junction temperature.
- 2、V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=17A., R_G=25 , Starting T_J=25°C.
- 3、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
- 4、Essentially independent of operating temperature.

30V N+P-Channel Enhancement Mode MOSFET

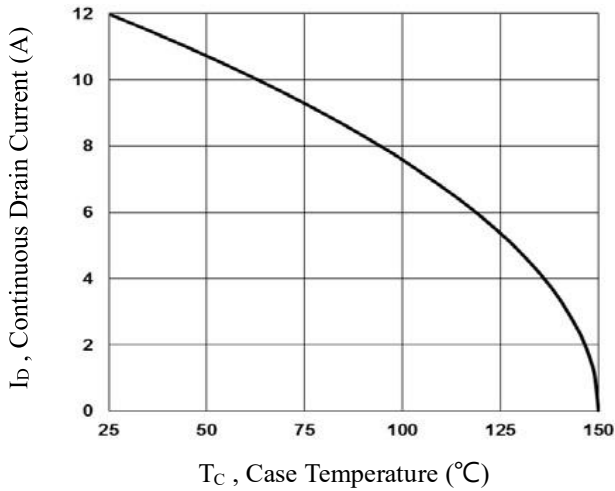


Fig.1 Continuous Drain Current vs. Tc

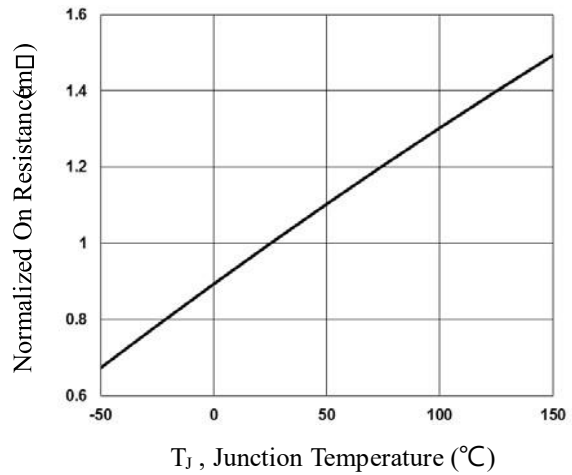


Fig.2 Normalized RDSON vs. Tj

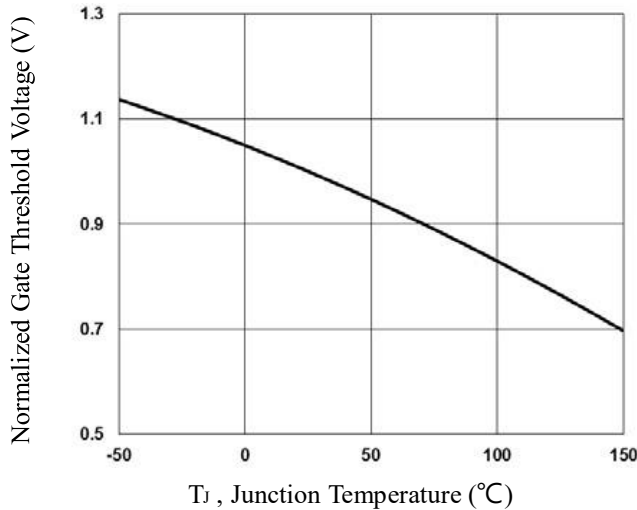


Fig.3 Normalized Vth vs. Tj

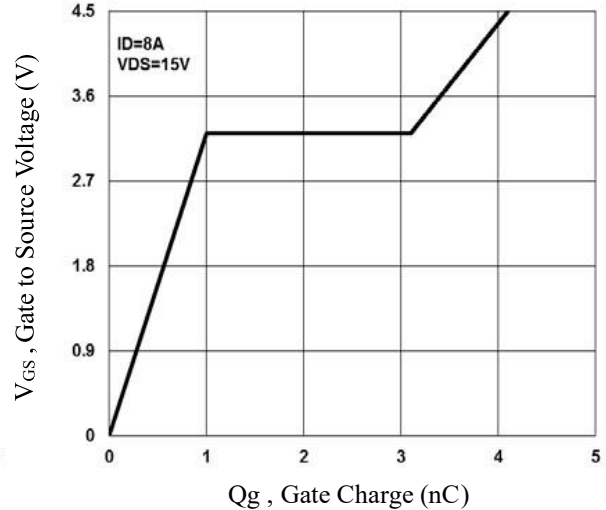
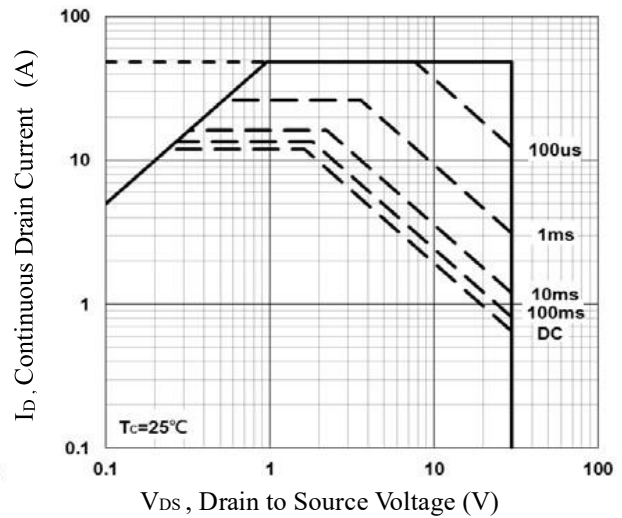
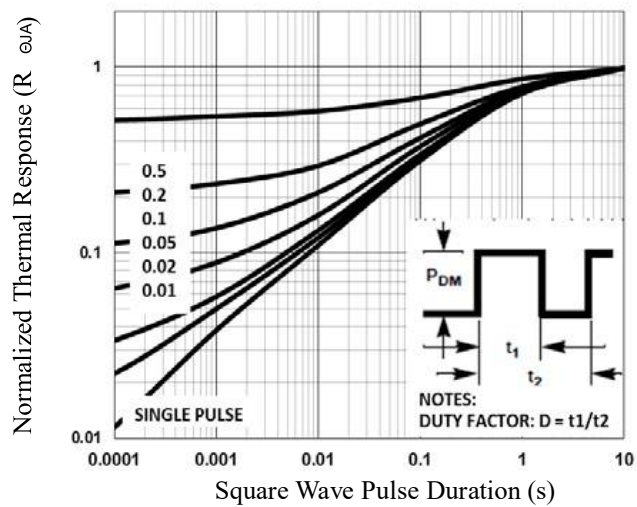


Fig.4 Gate Charge Waveform



30V N+P-Channel Enhancement Mode MOSFET

Fig.5 Normalized Transient Response

Fig.6 Maximum Safe Operation Area

P-CH Electrical Characteristics (T_J=25 °C, unless otherwise Off Characteristics)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-30	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.03	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-30V, V _{GS} =0V, T _J =25°C	---	---	-1	uA
		V _{DS} =-24V, V _{GS} =0V, T _J =125°C	---	---	-10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-5A	---	43	48	mΩ
		V _{GS} =-4.5V, I _D =-3A	---	66	75	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.2	-1.5	-2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient	V _{DS} =-10V, I _D =-3A	---	4	---	mV/°C
g _{fs}	Forward Transconductance		---	3.5	---	S
Q _g	Total Gate Charge ^{7,8}	V _{DS} =-15V, V _{GS} =-4.5V, I _D =-3A	---	5.1	7	nC
Q _{gs}	Gate-Source Charge ^{7,8}		---	2	3	
Q _{gd}	Gate-Drain Charge ^{7,8}		---	2.2	4	
T _{d(on)}	Turn-On Delay Time ^{7,8}	V _{DD} =-15V, V _{GS} =-10V, R _G =6 I _D =-1A	---	3.4	6	ns
T _r	Rise Time ^{7,8}		---	10.8	21	
T _{d(off)}	Turn-Off Delay Time ^{7,8}		---	26.9	51	
T _f	Fall Time ^{7,8}		---	6.9	13	
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, F=1MHz	---	560	810	pF
C _{oss}	Output Capacitance		---	55	80	
C _{rss}	Reverse Transfer Capacitance		---	40	60	
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	-8	A
I _{SM}	Pulsed Source Current		---	---	-16	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1	V

Note :

5. Repetitive Rating : Pulsed width limited by maximum junction temperature

 6. VThe data tested by pulsed, pulse width $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-10A, R \leq 300us$, duty cycle $G=25\%$, Starting $T_J=25 \leq 2\%$. °C

8. Essentially independent of operating temperature.



30V N+P-Channel Enhancement Mode MOSFET

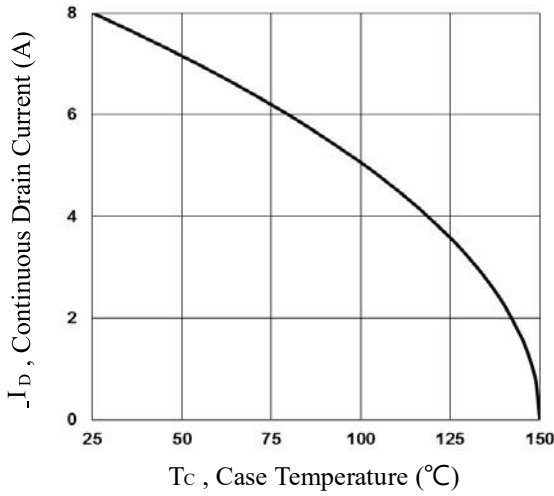


Fig.1 Continuous Drain Current vs. Tc

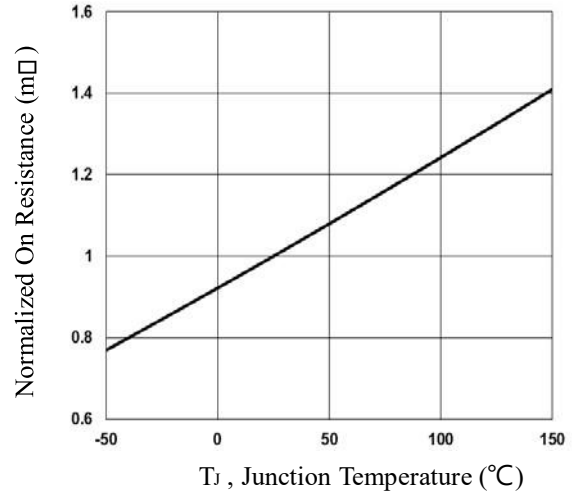


Fig.2 Normalized RDSON vs. Tj

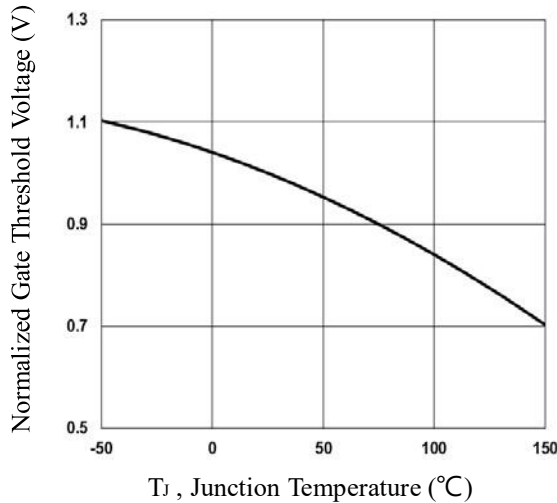


Fig.3 Normalized Vth vs. Tj

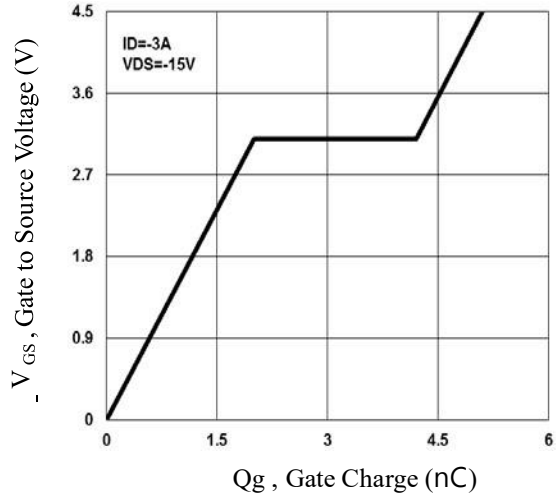


Fig.4 Gate Charge Waveform

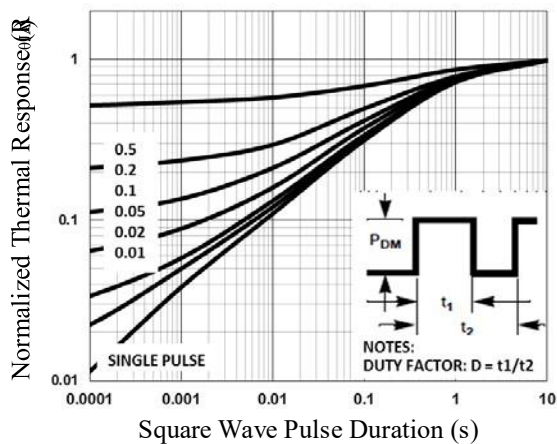


Fig.5 Normalized Transient Impedance

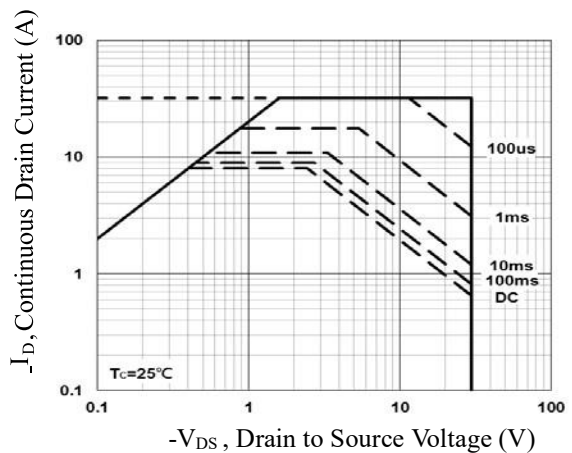
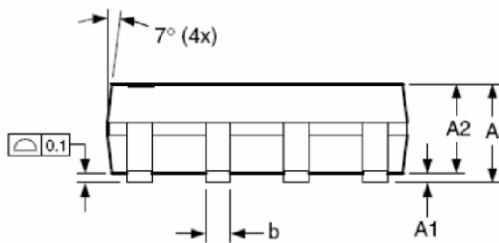
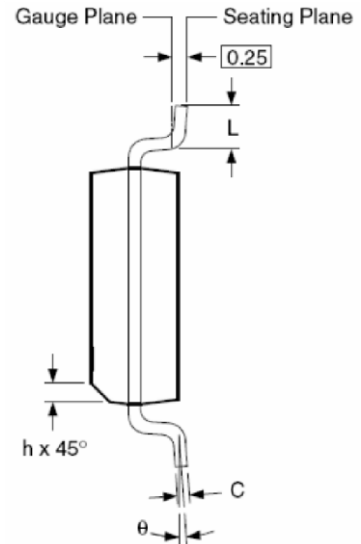
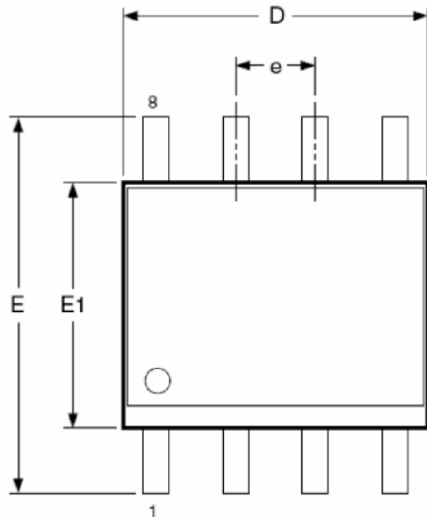


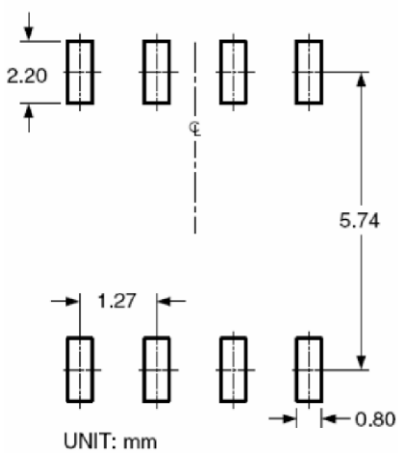
Fig.6 Maximum Safe Operation Area



SOP-8



RECOMMENDED LAND PATTERN



Dimensions in millimeters

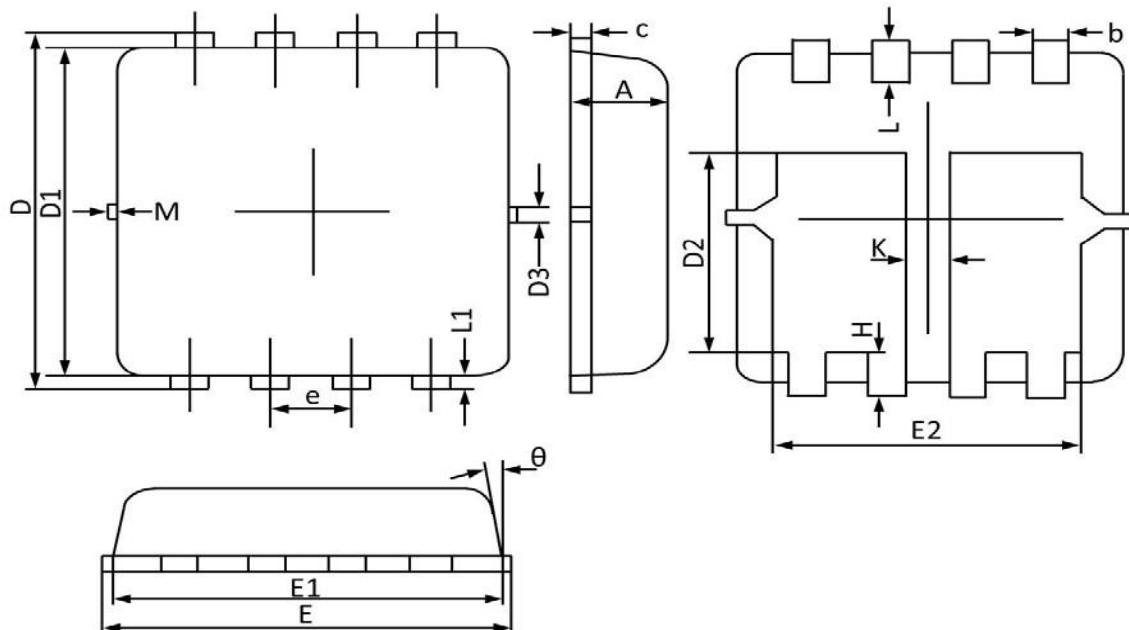
Symbols	Min.	Nom.	Max.
A	1.35	1.65	1.75
A1	0.10	—	0.25
A2	1.25	1.50	1.65
b	0.31	—	0.51
c	0.17	—	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
e	1.27 BSC		
E	5.80	6.00	6.20
h	0.25	—	0.50
L	0.40	—	1.27
θ	0°	—	8°

Dimensions in inches

Symbols	Min.	Nom.	Max.
A	0.053	0.065	0.069
A1	0.004	—	0.010
A2	0.049	0.059	0.065
b	0.012	—	0.020
c	0.007	—	0.010
D	0.189	0.193	0.197
E1	0.150	0.154	0.157
e	0.050 BSC		
E	0.228	0.236	0.244
h	0.010	—	0.020
L	0.016	—	0.050
θ	0°	—	8°

30V N+P-Channel Enhancement Mode MOSFET

DFN3x3-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
K	0.300 REF		0.012 REF	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	



30V N+P-Channel Enhancement Mode MOSFET**Attention**

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