

APM2070PU-VB Datasheet

P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
- 30	0.033 at $V_{GS} = - 10$ V	- 38	19 nC
	0.046 at $V_{GS} = - 4.5$ V	- 25	

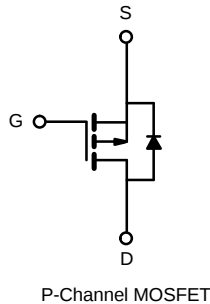
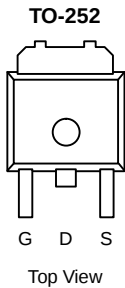
FEATURES

- Halogen-free
- Trench Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested


RoHS
 COMPLIANT

APPLICATIONS

- Load Switch
- Notebook Adaptor Switch



ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	I_D	- 38	A
	$T_C = 70$ °C		- 25	
	$T_A = 25$ °C		- 14.9 ^{a, b}	
	$T_A = 70$ °C		- 13.6 ^{a, b}	
Pulsed Drain Current		I_{DM}	- 112	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	- 4.1	
	$T_A = 25$ °C		- 2.2 ^{a, b}	
Avalanche Current	L = 0.1 mH	I_{AS}	- 20	mJ
Single-Pulse Avalanche Energy		E_{AS}	20	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	25	W
	$T_C = 70$ °C		20	
	$T_A = 25$ °C		2.7 ^{a, b}	
	$T_A = 70$ °C		1.7 ^{a, b}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, c}	$t \leq 10$ s	R_{thJA}	38	46	°C/W
Maximum Junction-to-Foot	Steady State	R_{thJF}	20	25	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

 b. $t = 10$ s.

c. Maximum under Steady State conditions is 85 °C/W.

 d. Based on $T_C = 25$ °C.

SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 34		mV/ °C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			5.3		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.0		- 2.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 25 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 30 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 30 V, V _{GS} = 0 V, T _J = 55 °C			- 5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ - 10 V, V _{GS} = - 10 V	- 30			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 10 A		0.033		Ω
		V _{GS} = - 4.5 V, I _D = - 8 A		0.046		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 10 A		28		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 15 V, V _{GS} = 0 V, f = 1 MHz		1350		pF
Output Capacitance	C _{oss}			255		
Reverse Transfer Capacitance	C _{rss}			190		
Total Gate Charge	Q _g	V _{DS} = - 15 V, V _{GS} = - 10 V, I _D = - 10 A		27	43	nC
		V _{DS} = - 15 V, V _{GS} = - 4.5 V, I _D = - 10 A		19	25	
Q _{gs}			6			
Q _{gd}			12			
Gate Resistance	R _g	f = 1 MHz	0.5	2.2	4.4	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 1.5 Ω I _D ≡ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		13	25	ns
Rise Time	t _r			12	24	
Turn-Off DelayTime	t _{d(off)}			40	70	
Fall Time	t _f			9	18	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 1.5 Ω I _D ≡ - 10 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		48	80	
Rise Time	t _r			92	160	
Turn-Off DelayTime	t _{d(off)}			34	60	
Fall Time	t _f			19	35	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			- 4.1	A
Pulse Diode Forward Current	I _{SM}				- 40	
Body Diode Voltage	V _{SD}	I _S = - 3 A, V _{GS} = 0 V		- 0.75	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 10 A, dI/dt = 100 A/μs, T _J = 25 °C		27	45	ns
Body Diode Reverse Recovery Charge	Q _{rr}			16	27	nC
Reverse Recovery Fall Time	t _a			12		ns
Reverse Recovery Rise Time	t _b			15		

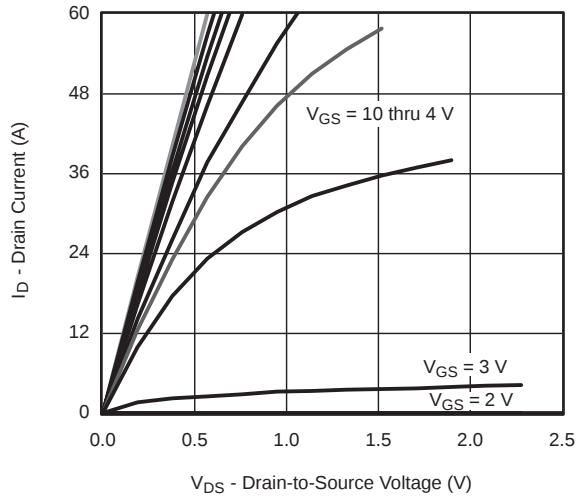
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

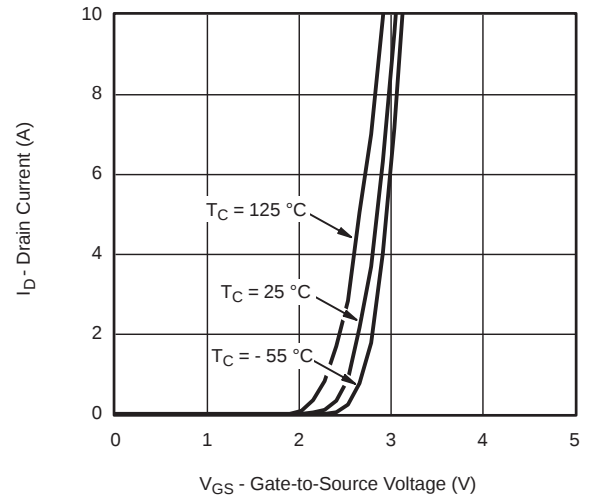
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

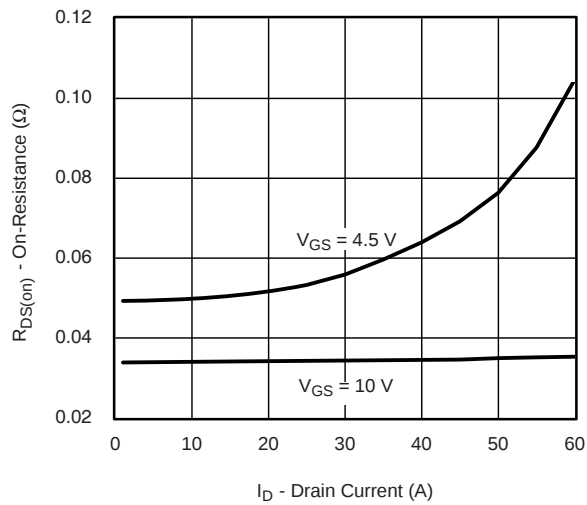
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



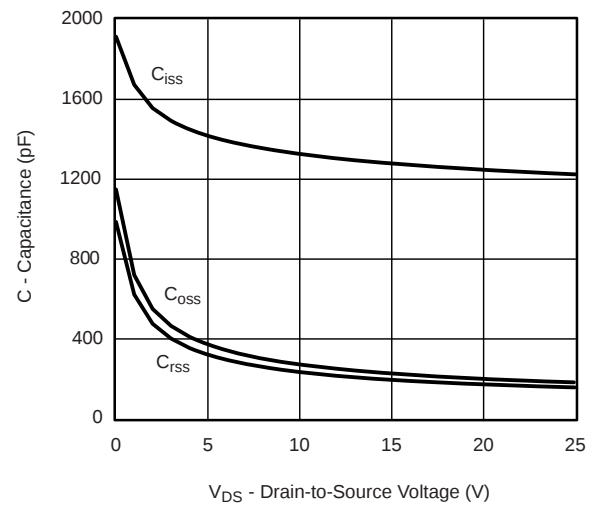
Output Characteristics



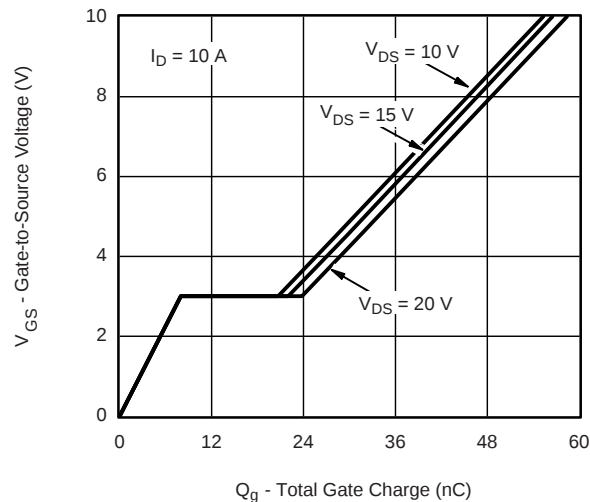
Transfer Characteristics



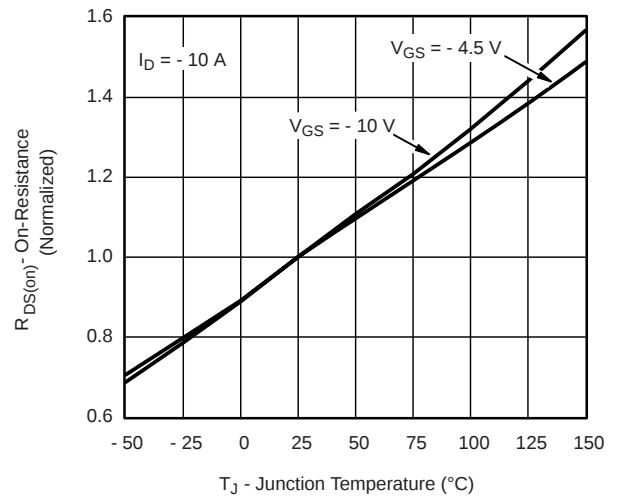
On-Resistance vs. Drain Current



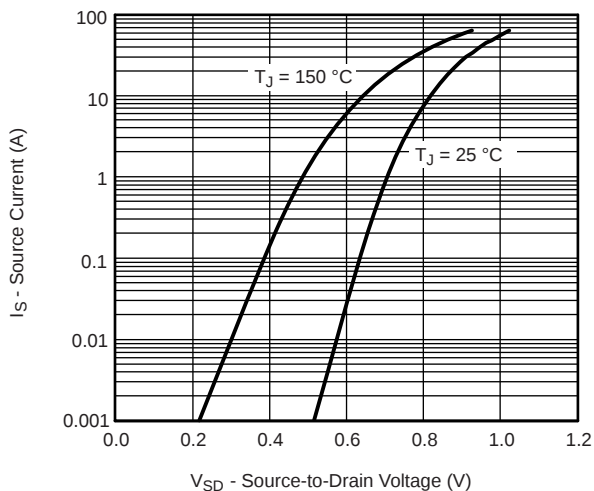
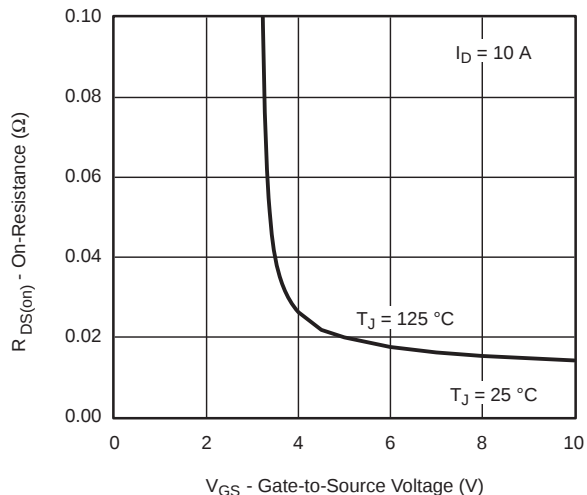
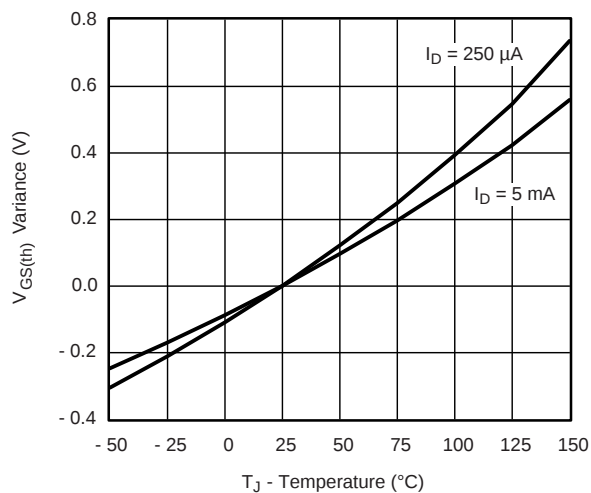
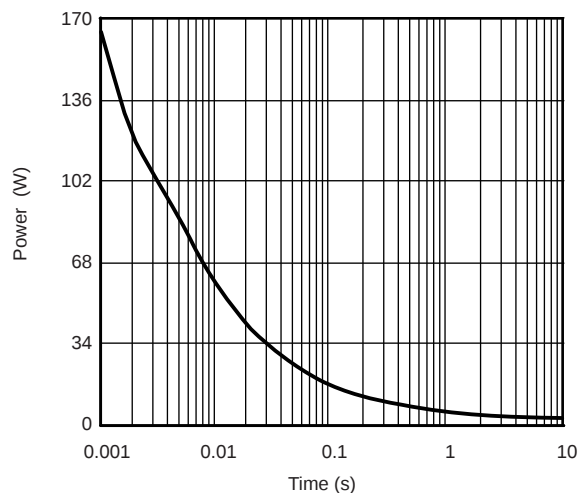
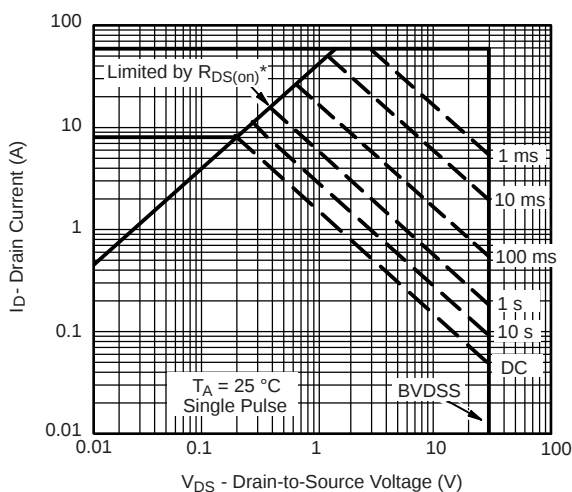
Capacitance



Gate Charge

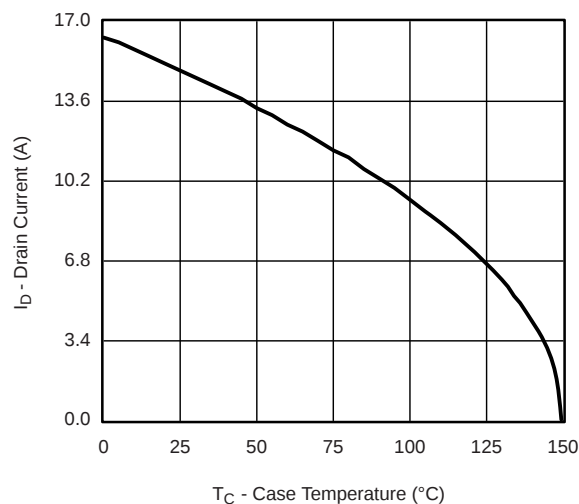
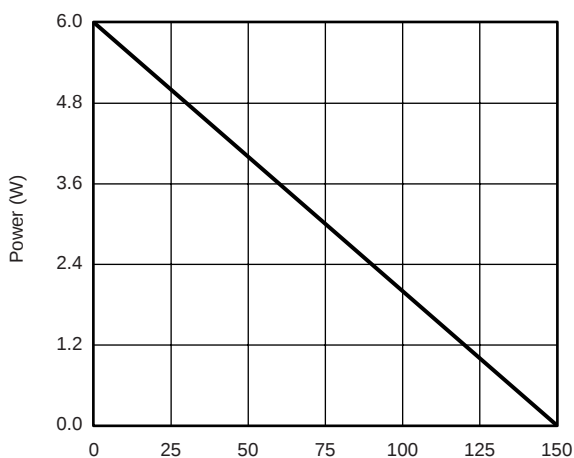
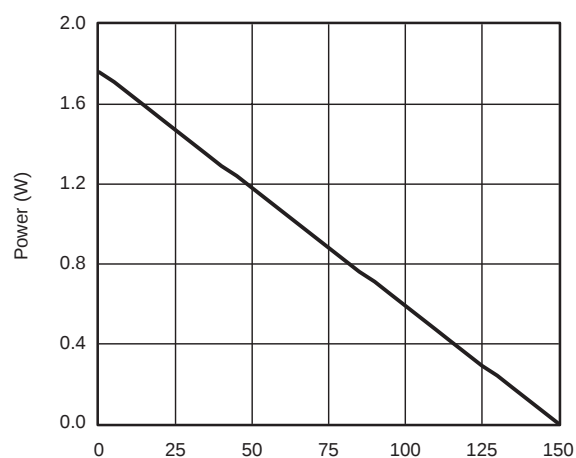


On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power, Junction-to-Ambient


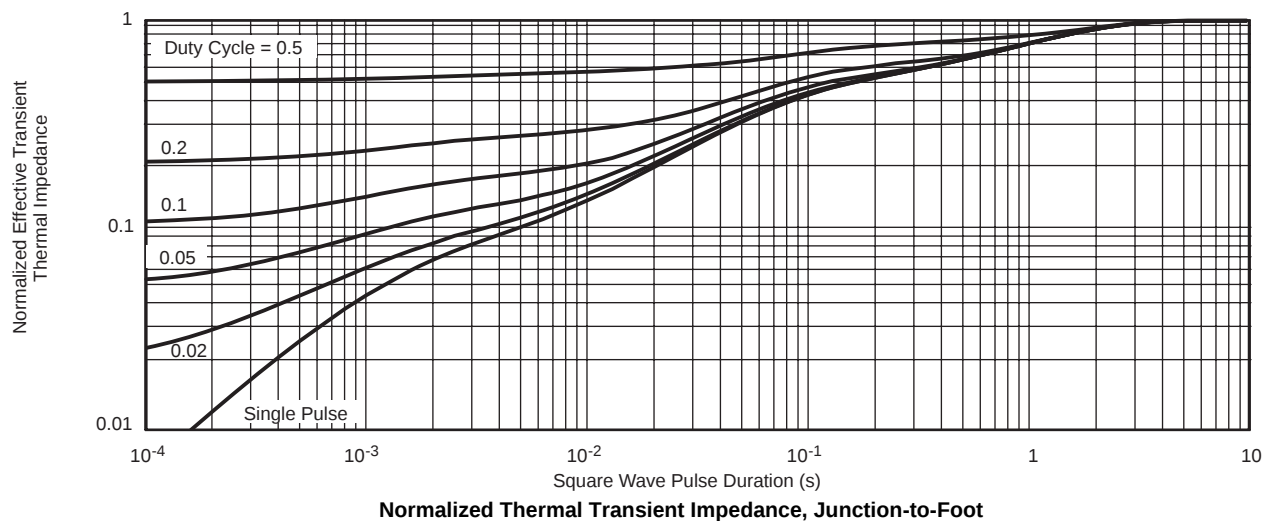
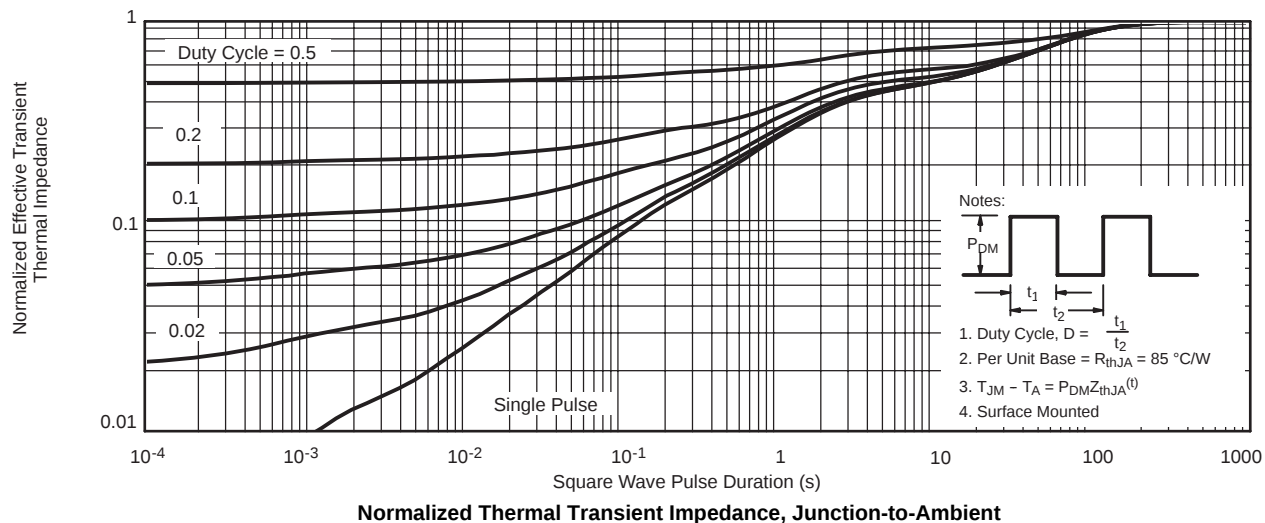
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

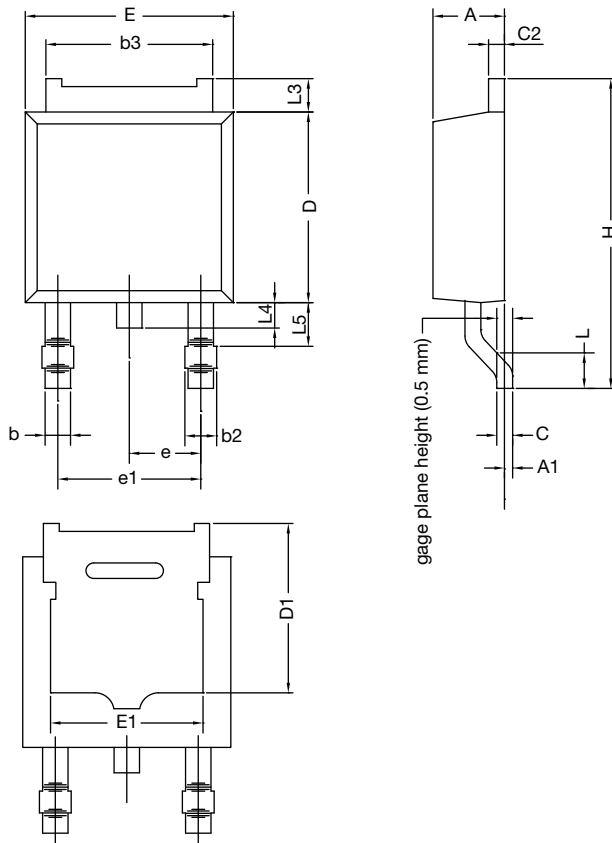
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Current Derating*

Power, Junction-to-Foot

Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



TO-252AA CASE OUTLINE

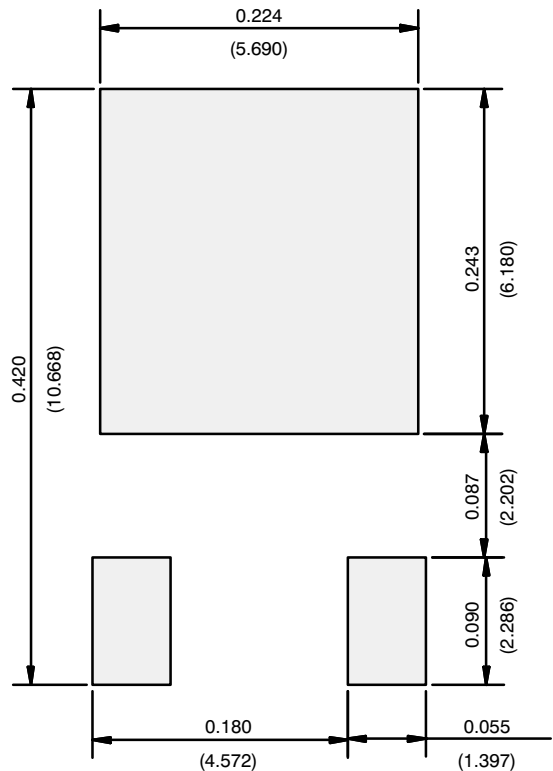


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060
ECN: X12-0247-Rev. M, 24-Dec-12				
DWG: 5347				

Note

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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