

AP20P02GH-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	

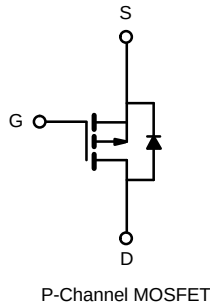
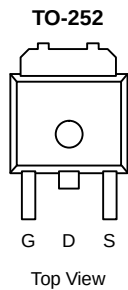
FEATURES

- 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	- 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	mJ
Continuous Source-Drain Diode Current	$T_C = 25$ °C	- 4.1	
	$T_A = 25$ °C	- 2.2 ^{a, b}	
Avalanche Current	I_{AS}	- 20	W
Single-Pulse Avalanche Energy	E_{AS}	20	
Maximum Power Dissipation	$T_C = 25$ °C	25	
	$T_C = 70$ °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}	R_{thJA}	38	46	°C/W
Maximum Junction-to-Foot	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	
Gate-Source Charge	Q _{gs}	V _{DS} = - 15 V, V _{GS} = - 4.5 V, I _D = - 10 A		19	25		
Gate-Drain Charge	Q _{gd}			6			
Gate Resistance	R _g			12			
Turn-On Delay Time	t _{d(on)}	f = 1 MHz	0.5	2.2	4.4	Ω	
Rise Time	t _r		V _{DD} = - 15 V, R _L = 1.5 Ω I _D ≅ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		13		25
Turn-Off DelayTime	t _{d(off)}				12		24
Fall Time	t _f				40		70
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			9	18	
Rise Time	t _r			48	80		
Turn-Off DelayTime	t _{d(off)}			92	160		
Fall Time	t _f			34	60		
				19	35	ns	
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			

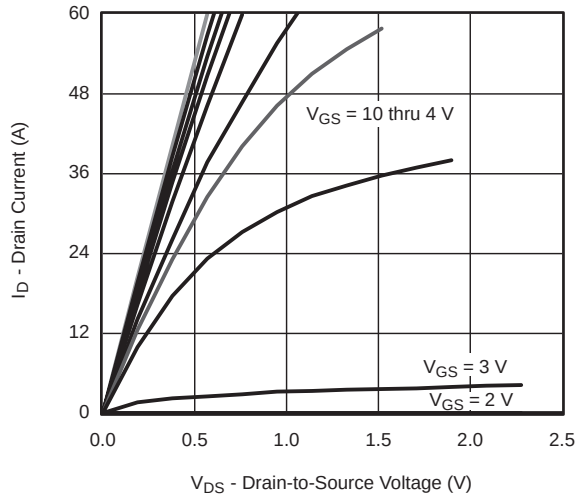
Notes:

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

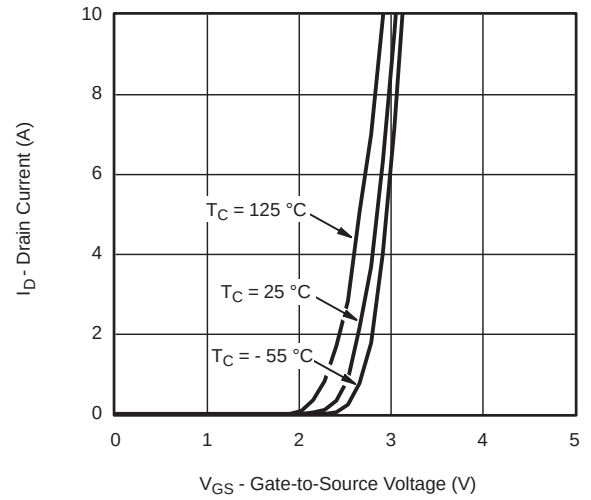
b. Guaranteed by design, not subject to production testing.

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.

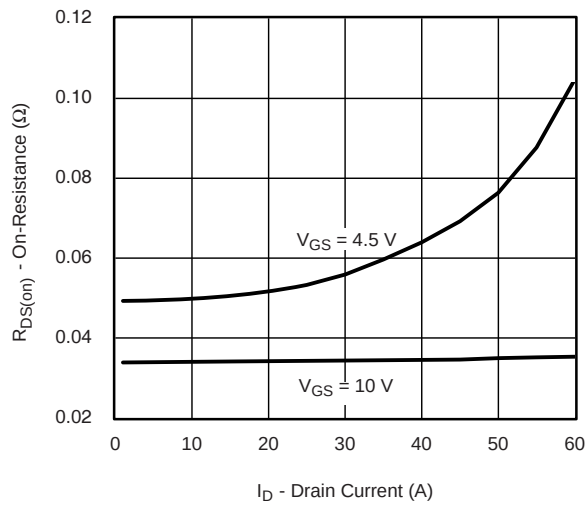
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



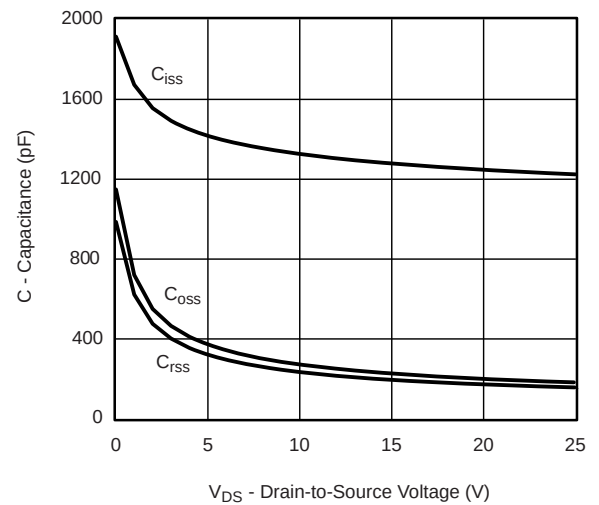
Output Characteristics



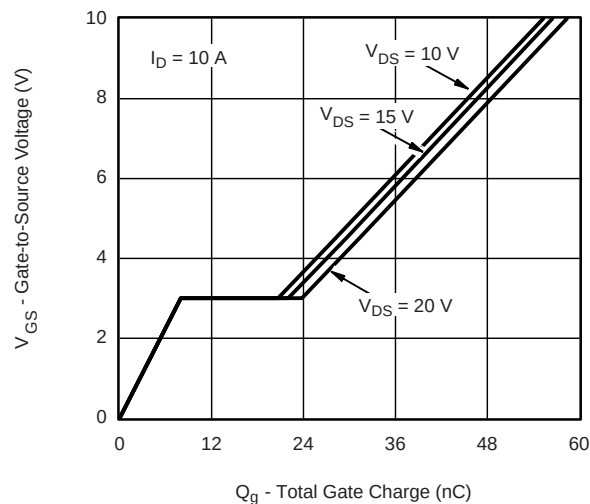
Transfer Characteristics



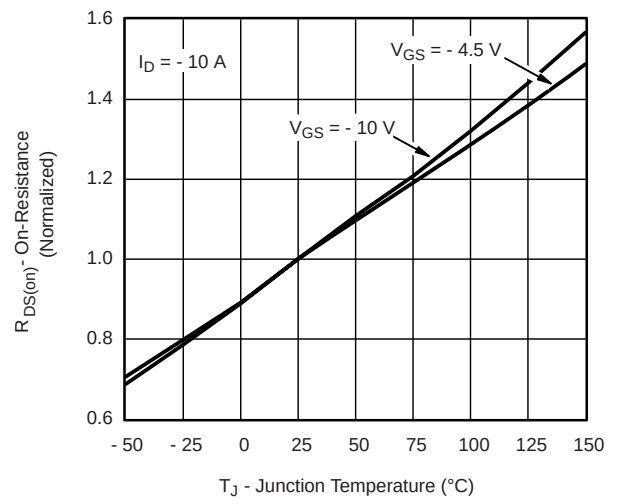
On-Resistance vs. Drain Current



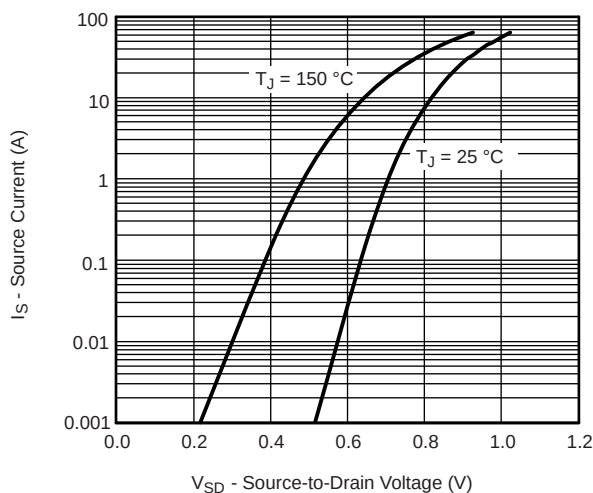
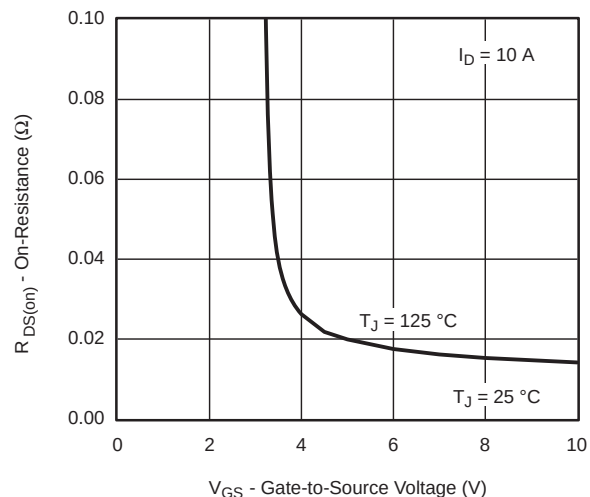
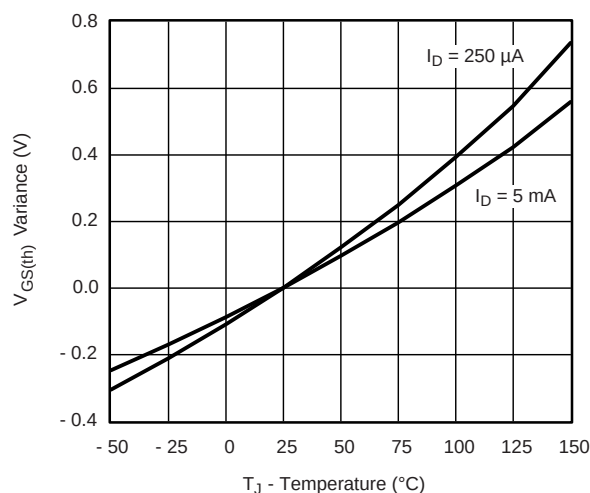
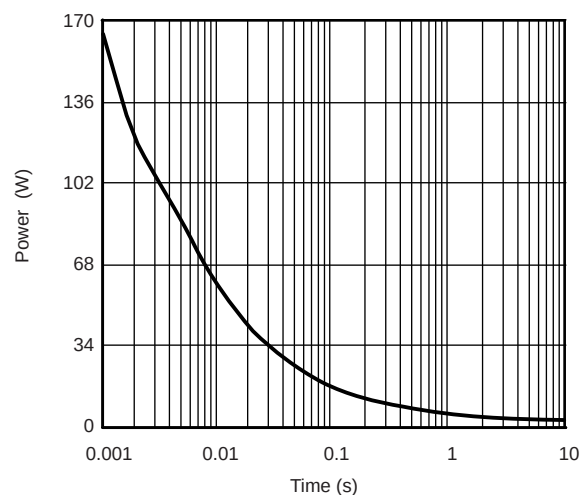
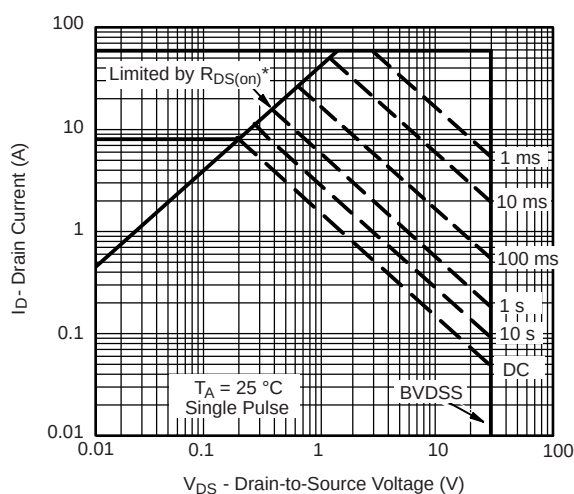
Capacitance



Gate Charge

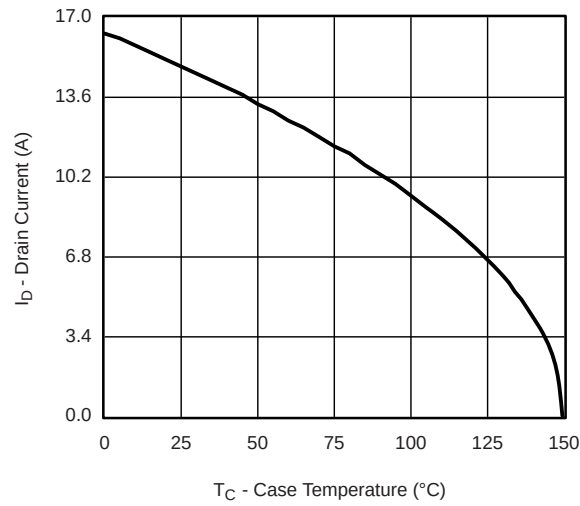
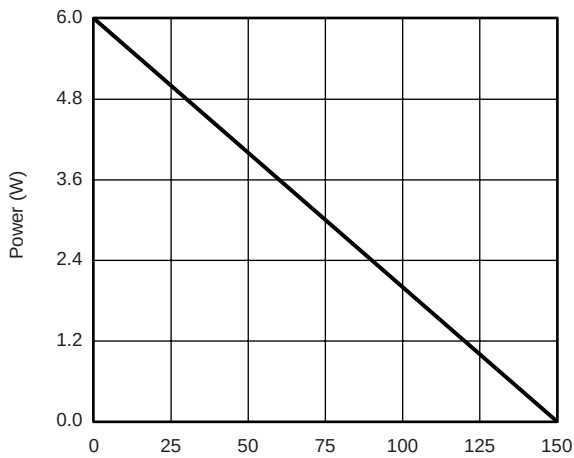
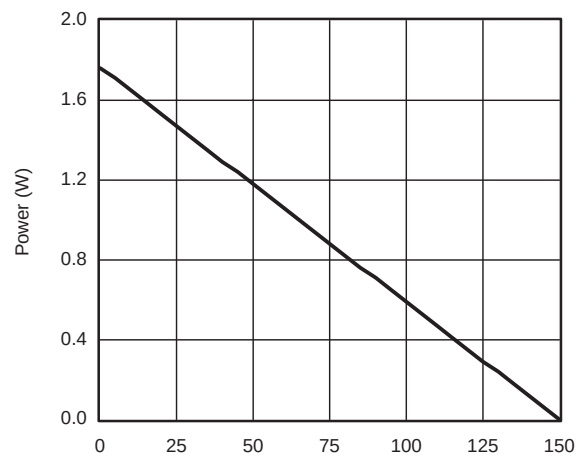


On-Resistance vs. Junction Temperature

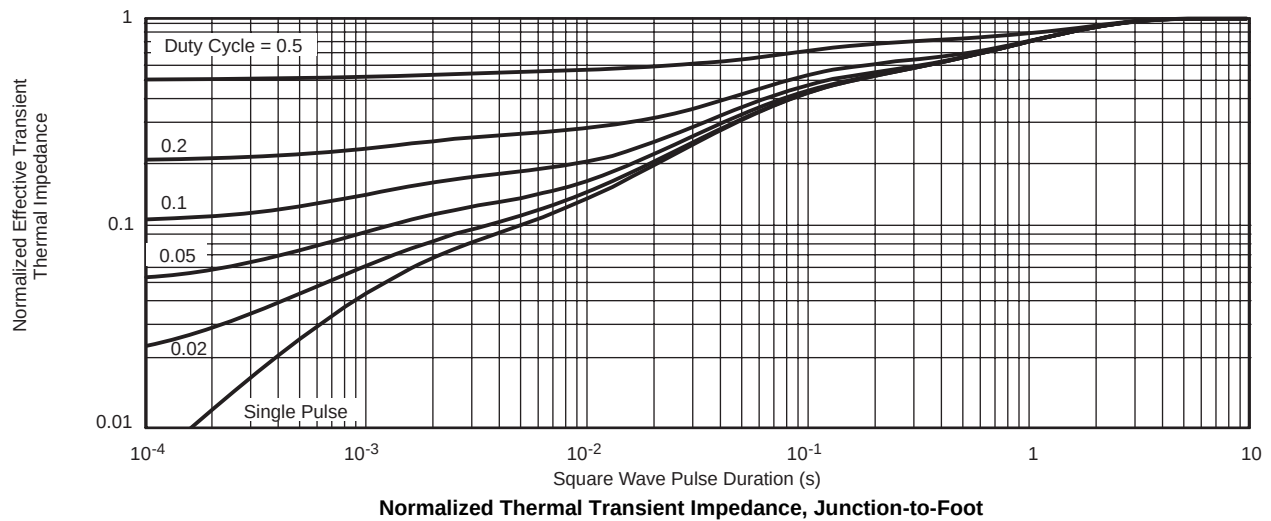
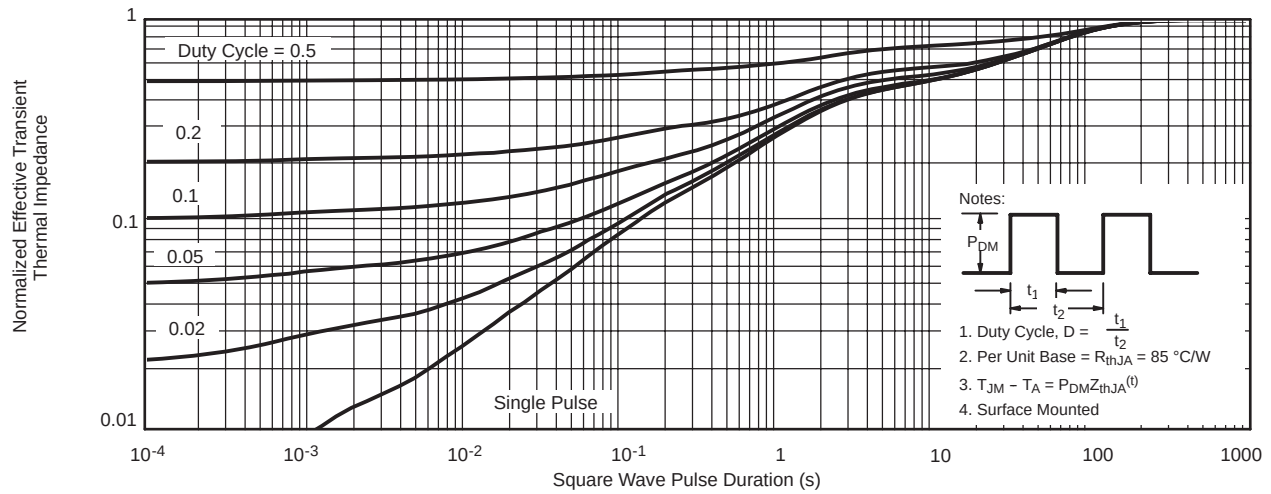
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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

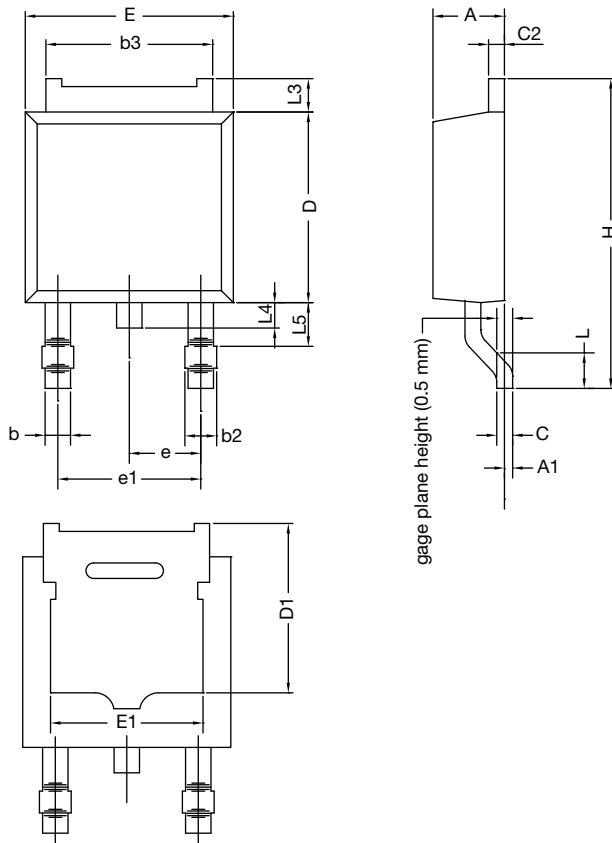
Safe Operating Area

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

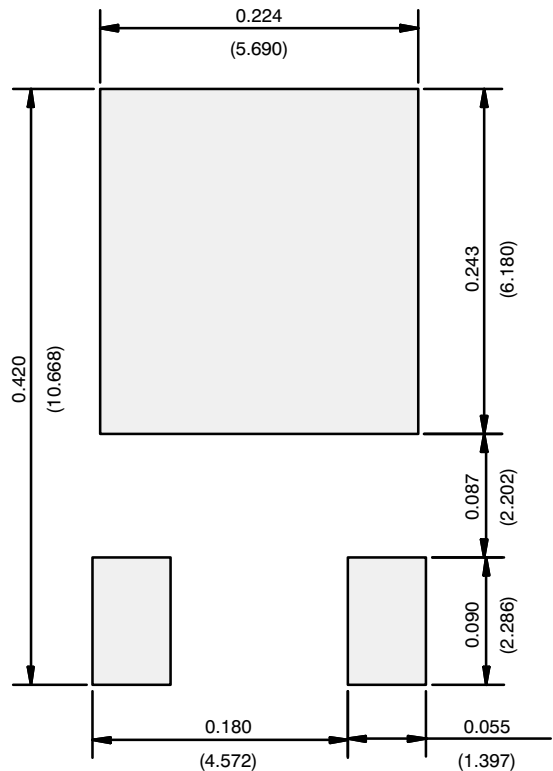


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	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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