

NP36P06KDG-VB Datasheet

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

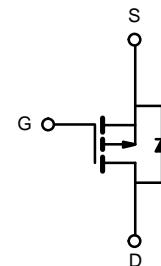
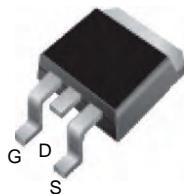
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
- 60	0.019 at $V_{GS} = - 10$ V	- 80	76 nC
	0.025 at $V_{GS} = - 4.5$ V	- 70	

FEATURES

- Trench Power MOSFET
- 100 % UIS Tested

APPLICATIONS

- Load Switch

D²PAK (TO-263)

P-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$I_C = 25$ °C	I_D	A
	$T_C = 70$ °C		
	$T_A = 25$ °C		
	$T_A = 70$ °C		
Pulsed Drain Current	I_{DM}	- 150	
Avalanche Current Pulse	I_{AS}	- 45	
Single Pulse Avalanche Energy	E_{AS}	101	mJ
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	A
	$T_A = 25$ °C		
Maximum Power Dissipation	$T_C = 25$ °C	P_D	W
	$T_C = 70$ °C		
	$T_A = 25$ °C		
	$T_A = 70$ °C		
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 ^b	R_{thJA}	33	40	°C/W
Maximum Junction-to-Case	R_{thJC}	0.98	1.2	

Notes:

a. Based on $T_C = 25$ °C.

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

SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

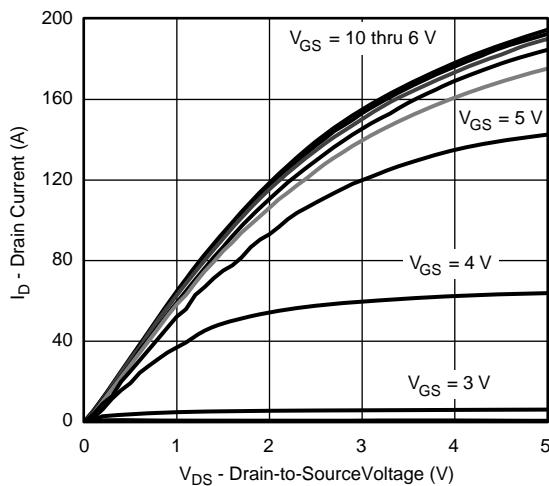
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$	- 60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250 \mu\text{A}$		68		$\text{mV}/^\circ\text{C}$
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 5.2		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$	- 1		- 3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}$			- 1	μA
		$V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} = -5 \text{ V}, V_{GS} = -10 \text{ V}$	- 120			A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = -10 \text{ V}, I_D = -30 \text{ A}$		0.019		Ω
		$V_{GS} = -4.5 \text{ V}, I_D = -20 \text{ A}$		0.025		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15 \text{ V}, I_D = -50 \text{ A}$	20			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		3500		pF
Output Capacitance	C_{oss}			390		
Reverse Transfer Capacitance	C_{rss}			290		
Total Gate Charge	Q_g	$V_{DS} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -55 \text{ A}$		76		nC
Gate-Source Charge	Q_{gs}			38		
Gate-Drain Charge	Q_{gd}			16		
Gate Resistance	R_g		$f = 1 \text{ MHz}$	19		
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = -2 \text{ V}, R_L = 2 \Omega$ $I_D \equiv -10 \text{ A}, V_{GEN} = -10 \text{ V}, R_g = 1 \Omega$		5.2		Ω
Rise Time	t_r			10	15	ns
Turn-Off Delay Time	$t_{d(\text{off})}$			7	15	
Fall Time	t_f			70	110	
				40	60	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$			- 69	A
Pulse Diode Forward Current ^a	I_{SM}				- 150	
Body Diode Voltage	V_{SD}	$I_S = -30 \text{ A}$		- 1	- 1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -50 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$		45	68	ns
Body Diode Reverse Recovery Charge	Q_{rr}			59	120	nC
Reverse Recovery Fall Time	t_a			29		ns
Reverse Recovery Rise Time	t_b			16		

Notes:

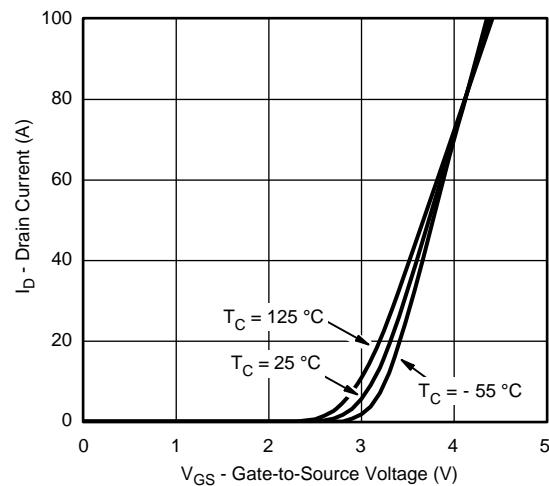
a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.

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

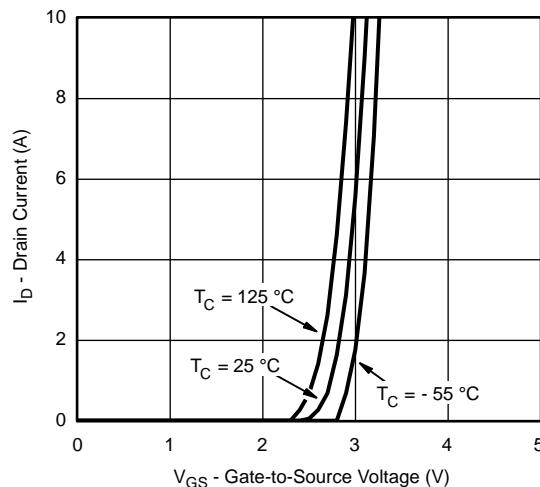
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


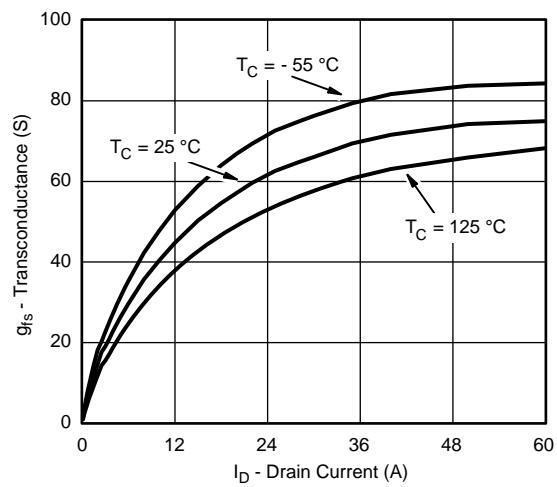
Output Characteristics



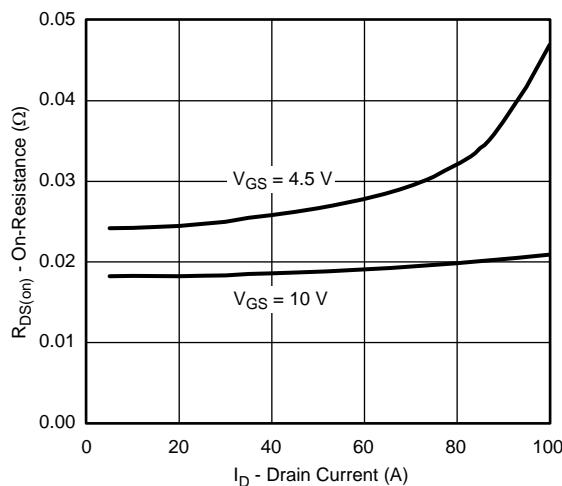
Transfer Characteristics



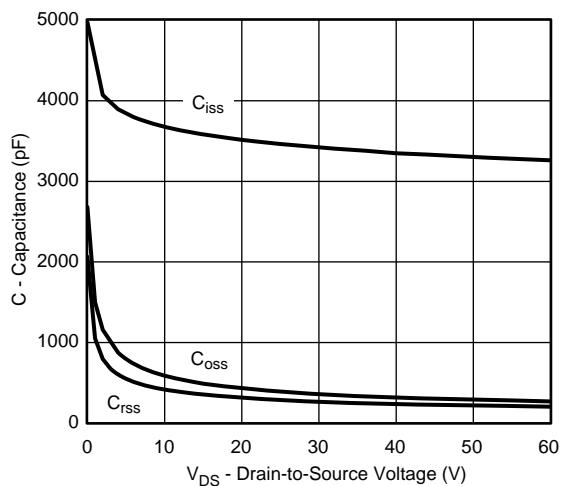
Transfer Characteristics



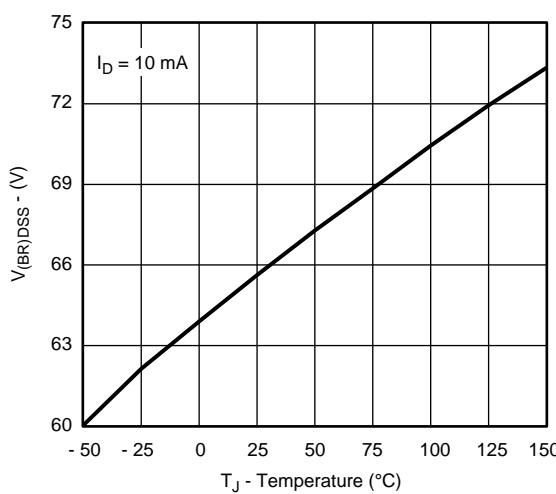
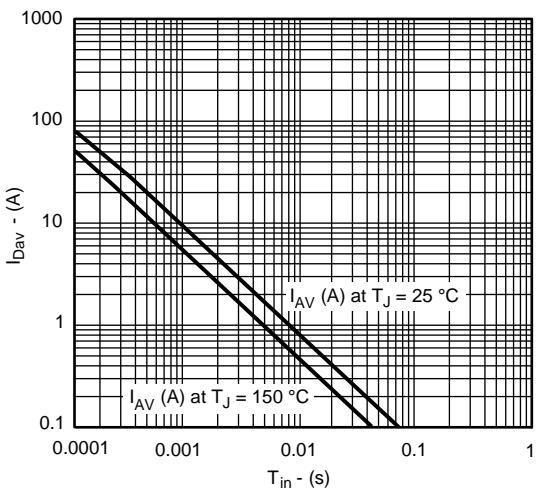
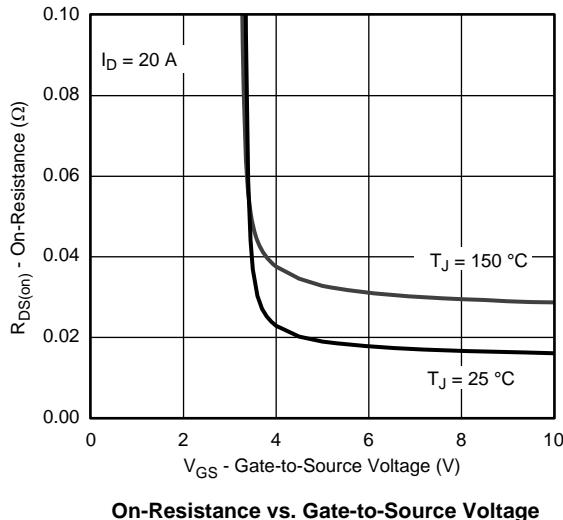
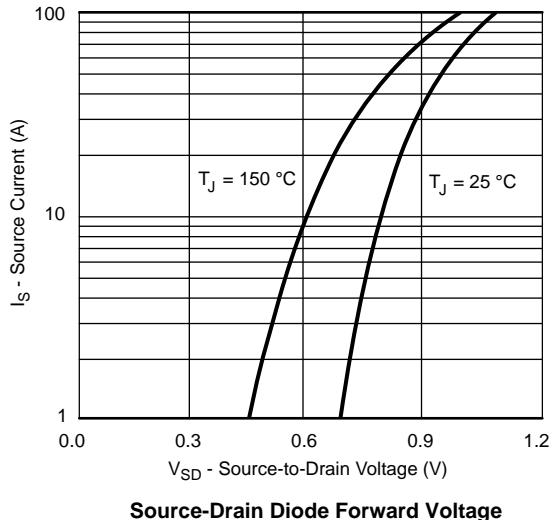
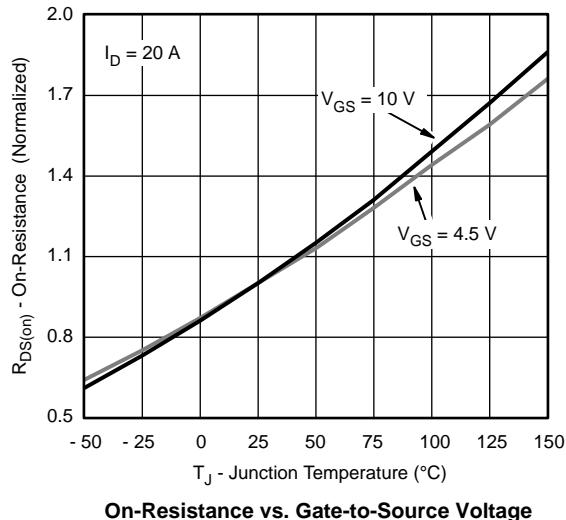
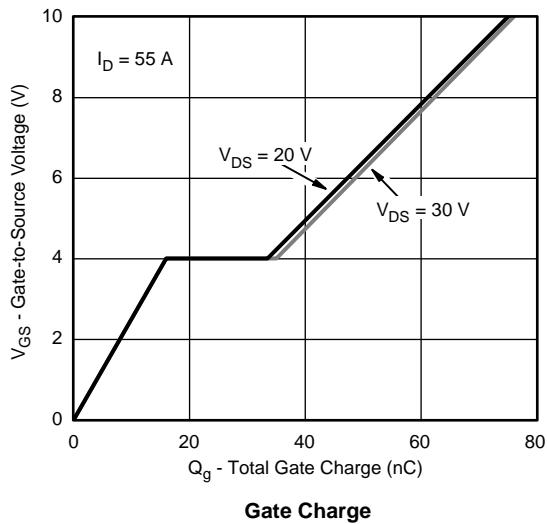
Transconductance

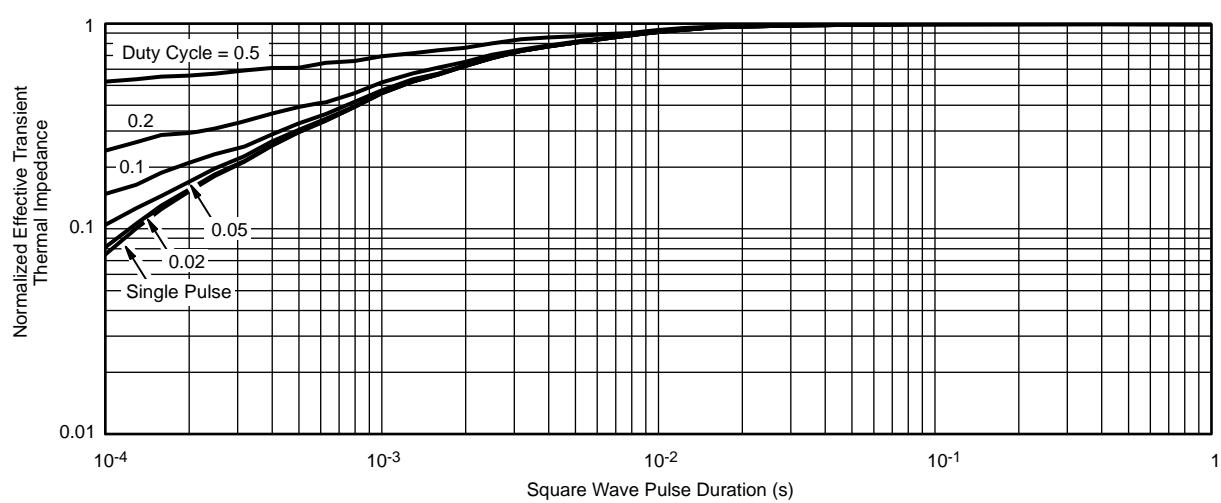
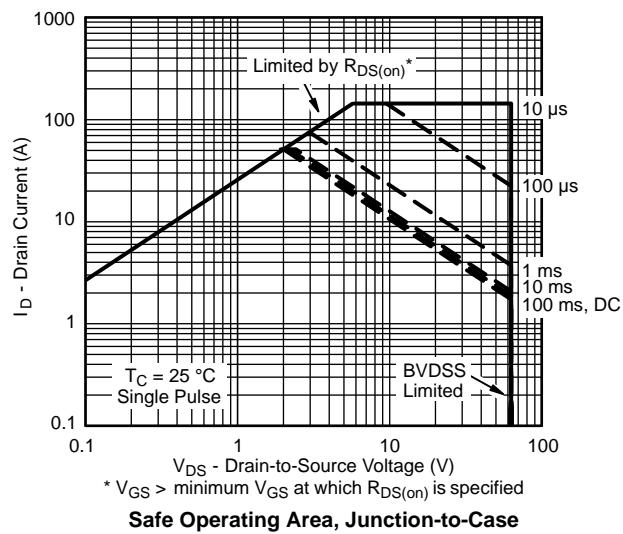
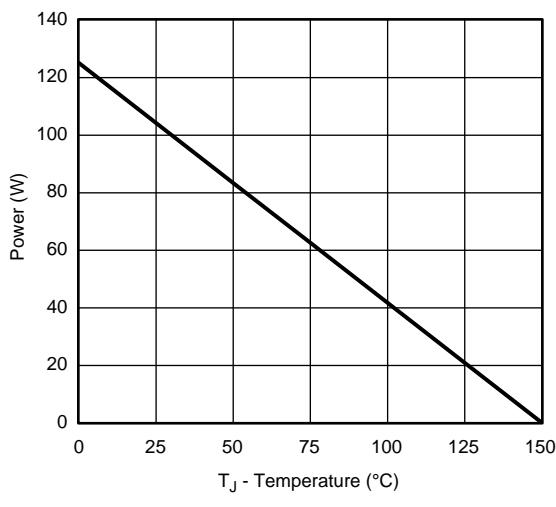
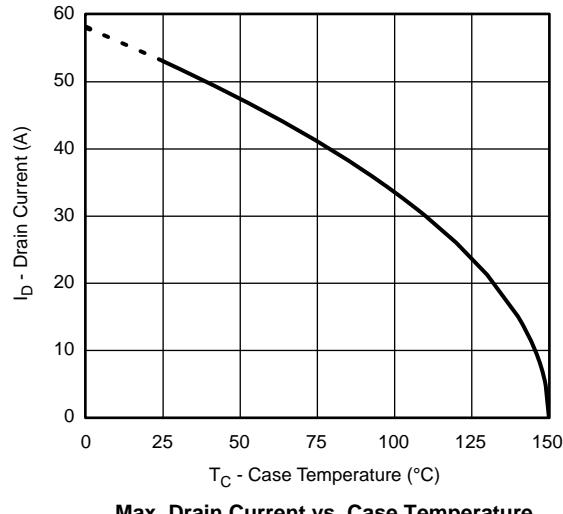
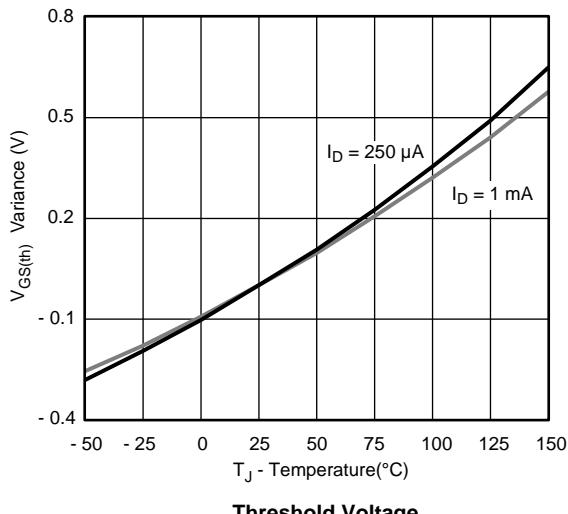


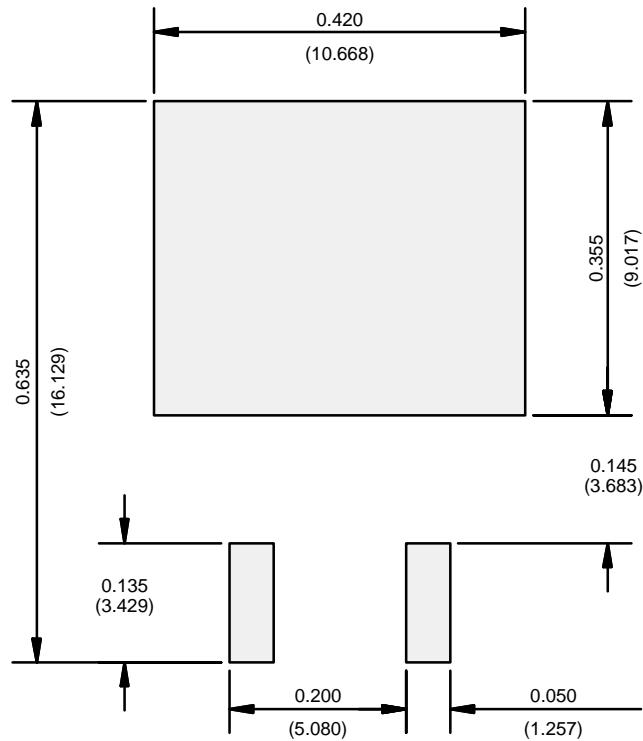
On-Resistance vs. Drain Current



Capacitance

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead

Recommended Minimum Pads
Dimensions in Inches/(mm)

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