

SiC MOS P3M06025BD

N-Channel Enhancement Mode

Features

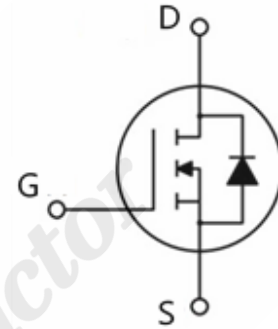
- High Blocking Voltage with Low On-Resistance
- High-Frequency Operation
- Ultra-Small Q_{gd}

Benefits

- Improve System Efficiency
- Increase Power Density
- Reduce Heat Sink Requirements
- Reduction of System Cost

Applications

- Solar Inverters
- EV Battery Chargers
- High Voltage DC/DC Converters
- Switch Mode Power Supplies



Order Information

Part Number	Die Size
P3M06025BD	Please contact your sales representative to get the detailed information about die layout and dimensions.



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PN Junction Semiconductor



1. Maximum Ratings

At $T_J = 25^\circ\text{C}$, unless specified otherwise

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DSmax}	650	V	$V_{GS} = 0V$ $I_D = 100\mu A$
Gate - Source Voltage (Dynamic)	V_{GSmax}	-8 / +20	V	AC ($f > 1\text{ Hz}$)
Gate – Source Voltage(static) turn-on gate voltage	$V_{GS,on}$	+15	V	Static
turn-off gate voltage	$V_{GS,off}$	-3		
Continuous Drain Current	I_D	97	A	$V_{GS} = 15V$ $T_C = 25^\circ\text{C}$
		69		$V_{GS} = 15V$ $T_C = 100^\circ\text{C}$
Operating Junction	T_J	-55 To +175	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-55 To +175	$^\circ\text{C}$	



2. Electrical Characteristics

At $T_J = 25^\circ\text{C}$, unless specified otherwise

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	650	/	/	V	$V_{GS} = 0V$ $I_D = 100\mu A$
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.4	/	V	(tested after 30ms pulse at $V_{GS} = 15V$) $V_{DS} = V_{GS}$ $I_D = 10mA$ $T_J = 25^\circ\text{C}$
		/	1.7	/	V	$V_{DS} = V_{GS}$ $I_D = 10mA$ $T_J = 175^\circ\text{C}$
Reverse Bias Drain Current	I_{DSS}	/	1	100	μA	$V_{GS} = 0V$ $V_{DS} = 650V$
Gate-Source Leakage Current	I_{GSS}	/	1	200	nA	$V_{GS} = 15V$ $V_{DS} = 0V$
Drain-Source On-State Resistance	$R_{DS(on)}$	/	25	33	m Ω	$V_{GS} = 15V$ $I_D = 34A$ $T_J = 25^\circ\text{C}$
		/	29	/	m Ω	$V_{GS} = 15V$ $I_D = 34A$ $T_J = 175^\circ\text{C}$
Transconductance	g_{fs}	/	28	/	S	$V_{DS} = 20V$ $I_{DS} = 40A$ $T_J = 25^\circ\text{C}$
		/	27	/	S	$V_{DS} = 20V$ $I_{DS} = 40A$ $T_J = 175^\circ\text{C}$
Input Capacitance	C_{iss}	/	5378	/	pF	$V_{GS} = 0V$ $V_{DS} = 400V$
Output Capacitance	C_{oss}	/	297	/	pF	$f = 1MHz$ $V_{AC} = 25mV$



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Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Reverse Transfer Capacitance	C_{rss}	/	15.8	/	pF	$V_{GS} = 0V$ $V_{DS} = 400V$
Coss Stored Energy	E_{oss}	/	57	/	μJ	$f = 1MHz$ $V_{AC} = 25mV$
Internal Gate Resistance	$R_{G(int)}$	/	4.7	/	Ω	$f = 1MHz$ $V_{AC} = 25mV$
Gate to Source Charge	Q_{gs}	/	47.4	/	nC	$V_{DS} = 400V$ $I_{DS} = 34A$ $V_{GS} = -3 \text{ to } 15V$ $I_G = 20mA$
Gate to Drain Charge	Q_{gd}	/	34.7	/		
Total Gate Charge	Q_g	/	146	/		

3. Reverse Diode Characteristics

At $T_J = 25^\circ C$, unless specified otherwise

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	4.7	/	V	$V_{GS} = -3V$ $I_{SD} = 17A$ $T_J = 25^\circ C$
		4.1	/	V	$V_{GS} = -3V$ $I_{SD} = 17A$ $T_J = 175^\circ C$
Continuous Diode Forward Current	I_S	67	/	A	$V_{GS} = -3V$

4. Typical Performance

At $T_J = 25^\circ\text{C}$, unless specified otherwise

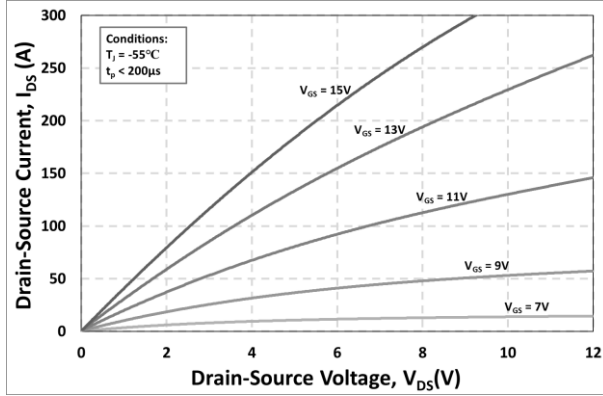


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

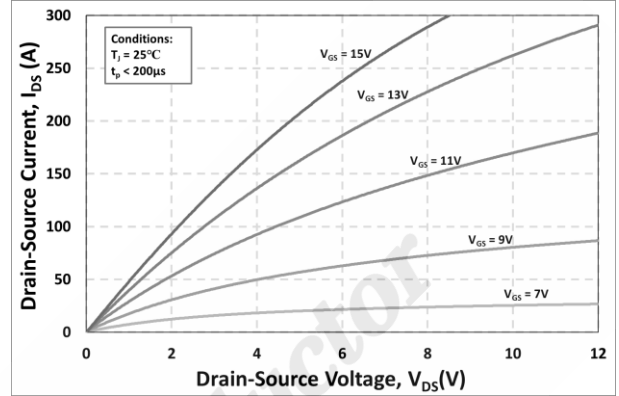


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

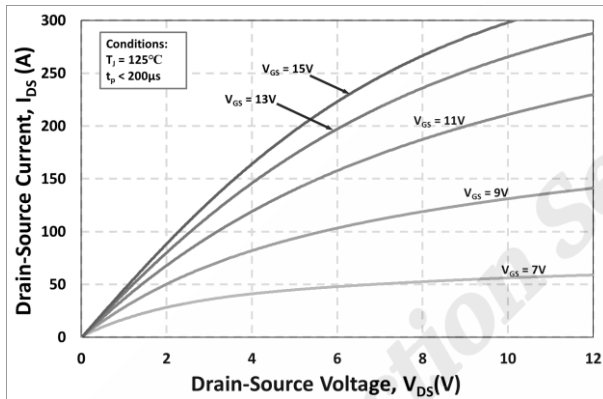


Figure 3. Output Characteristics $T_J = 125^\circ\text{C}$

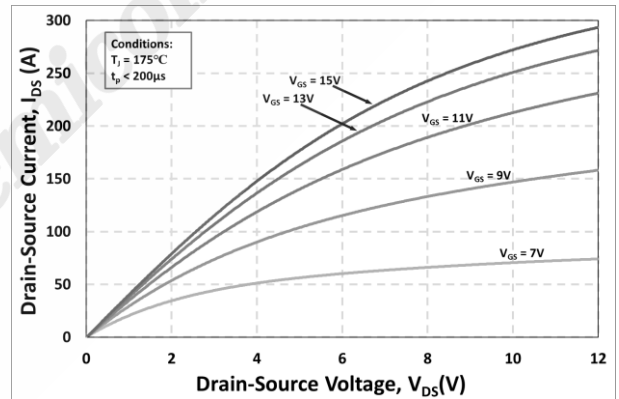


Figure 4. Output Characteristics $T_J = 175^\circ\text{C}$

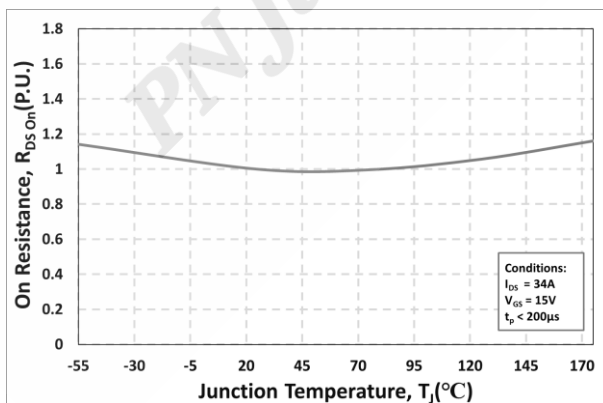


Figure 5. Normalized On-Resistance vs. Temperature

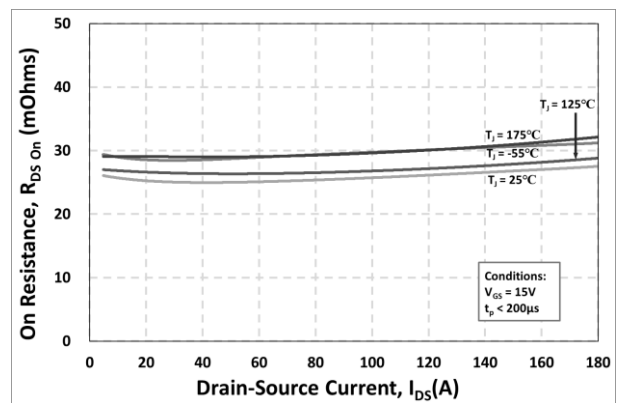


Figure 6. On-Resistance vs. Drain Current Various Temperatures

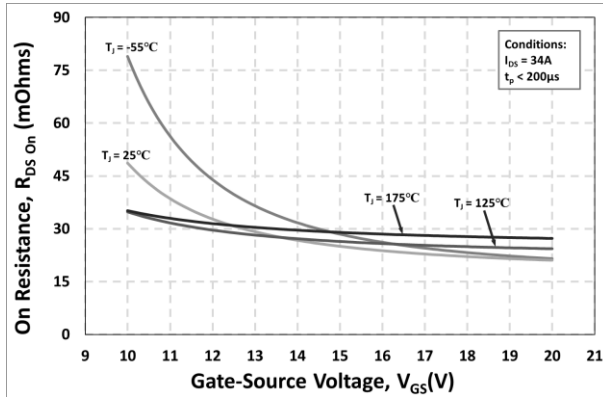


Figure 7. On-Resistance vs. Gate-Source Voltage

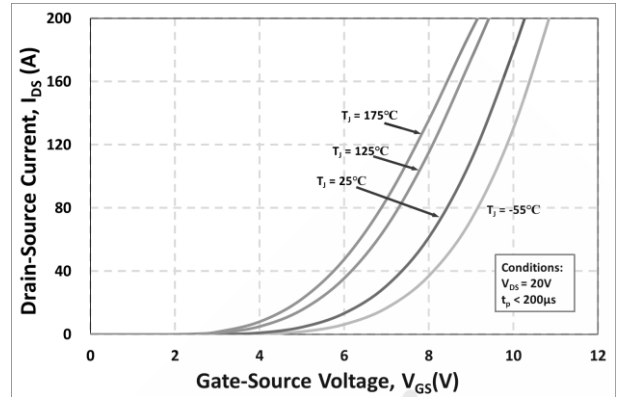


Figure 8. Transfer Characteristic for Various Junction Temperatures

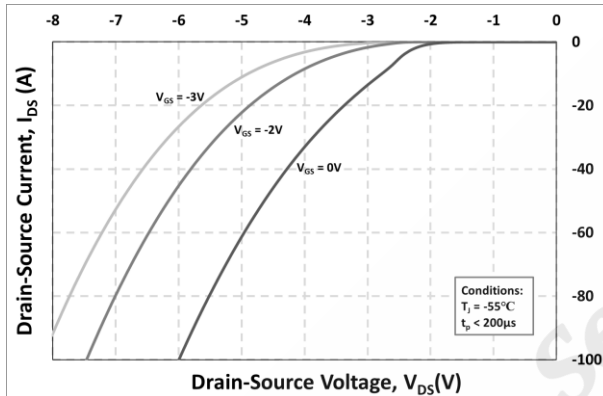


Figure 9. Body Diode Characteristic at -55°C

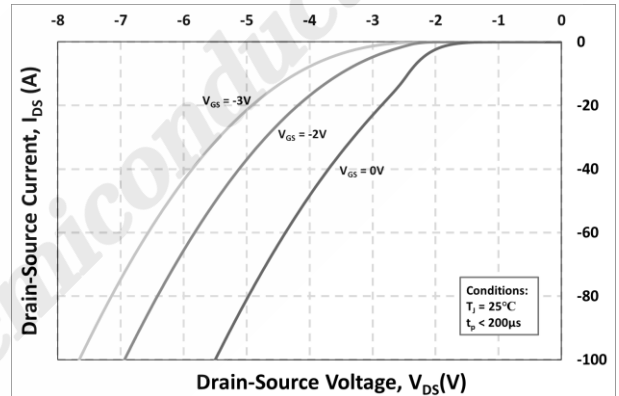


Figure 10. Body Diode Characteristic at 25°C

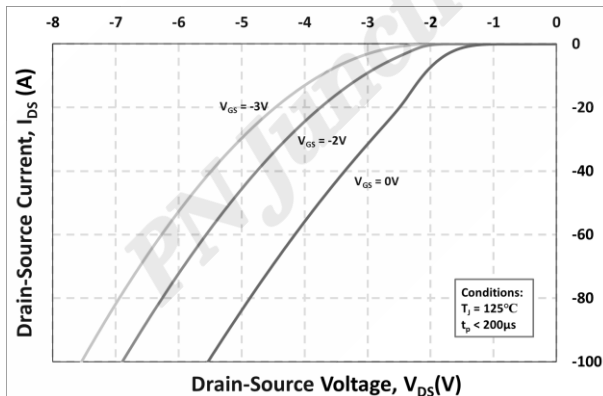


Figure 11. Body Diode Characteristic at 125°C

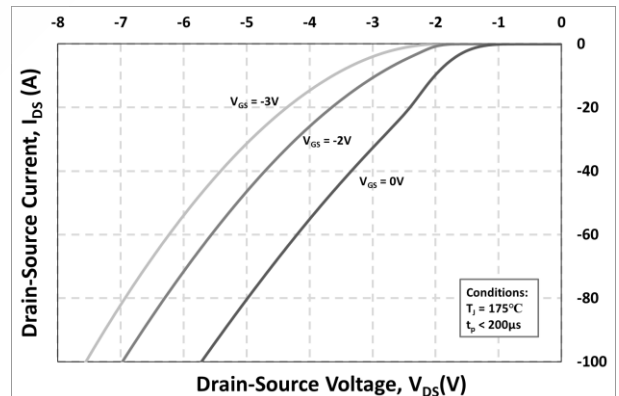


Figure 12. Body Diode Characteristic at 175°C

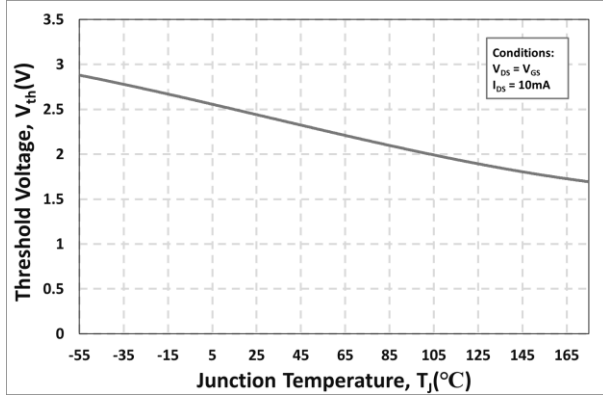


Figure 13. Threshold Voltage vs. Temperature

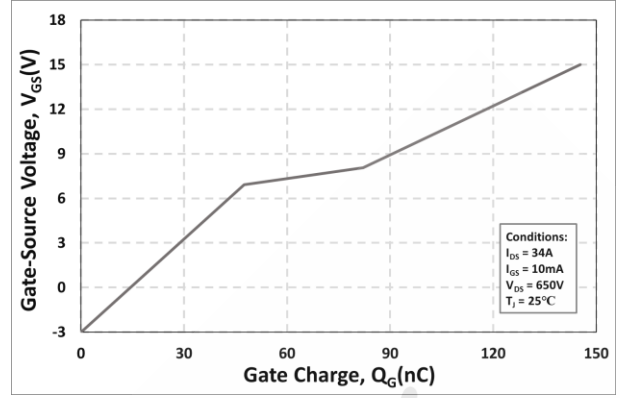


Figure 14. Gate Charge Characteristics

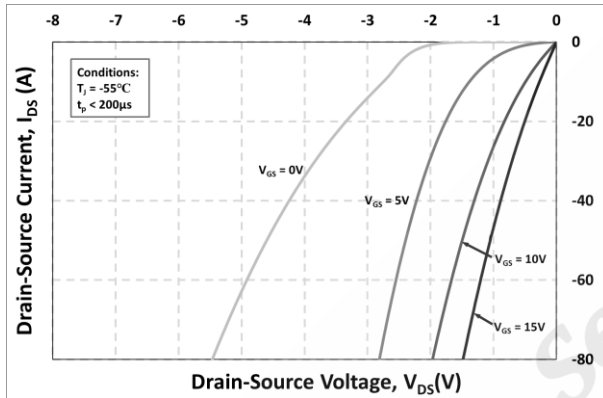


Figure 15. 3rd Quadrant Characteristic at -55°C

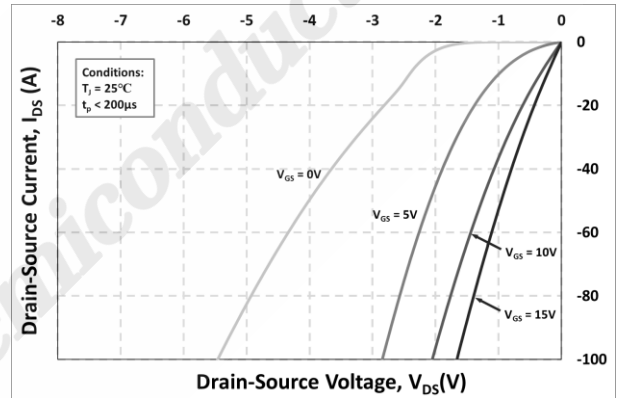


Figure 16. 3rd Quadrant Characteristic at 25°C

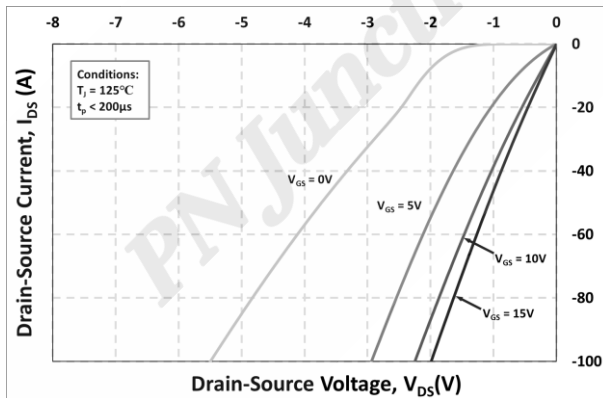


Figure 17. 3rd Quadrant Characteristic at 125°C

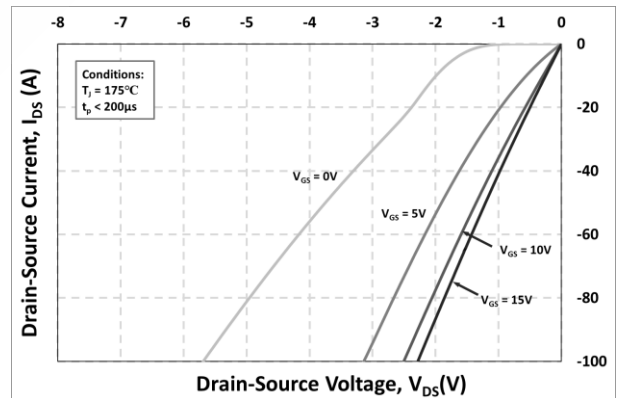


Figure 18. 3rd Quadrant Characteristic at 175°C

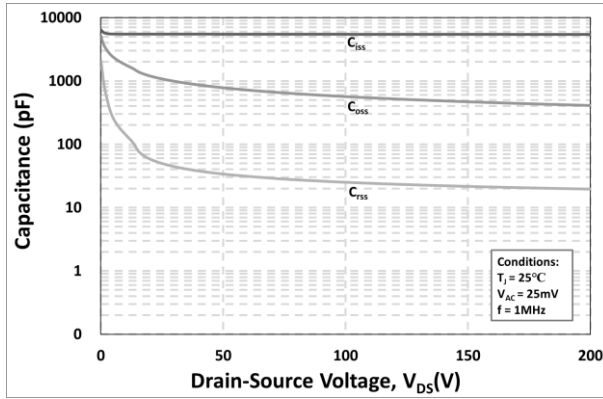


Figure 19. Capacitances vs. Drain-Source Voltage (0 - 200V)

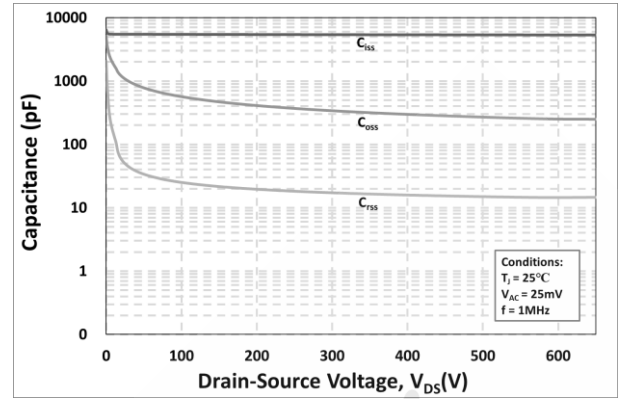


Figure 20. Capacitances vs. Drain-Source Voltage (0 - 650V)

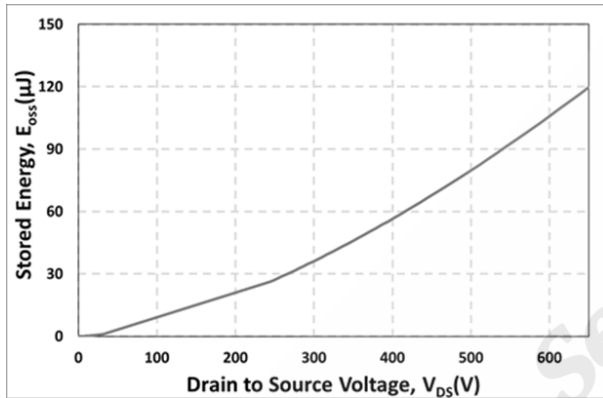
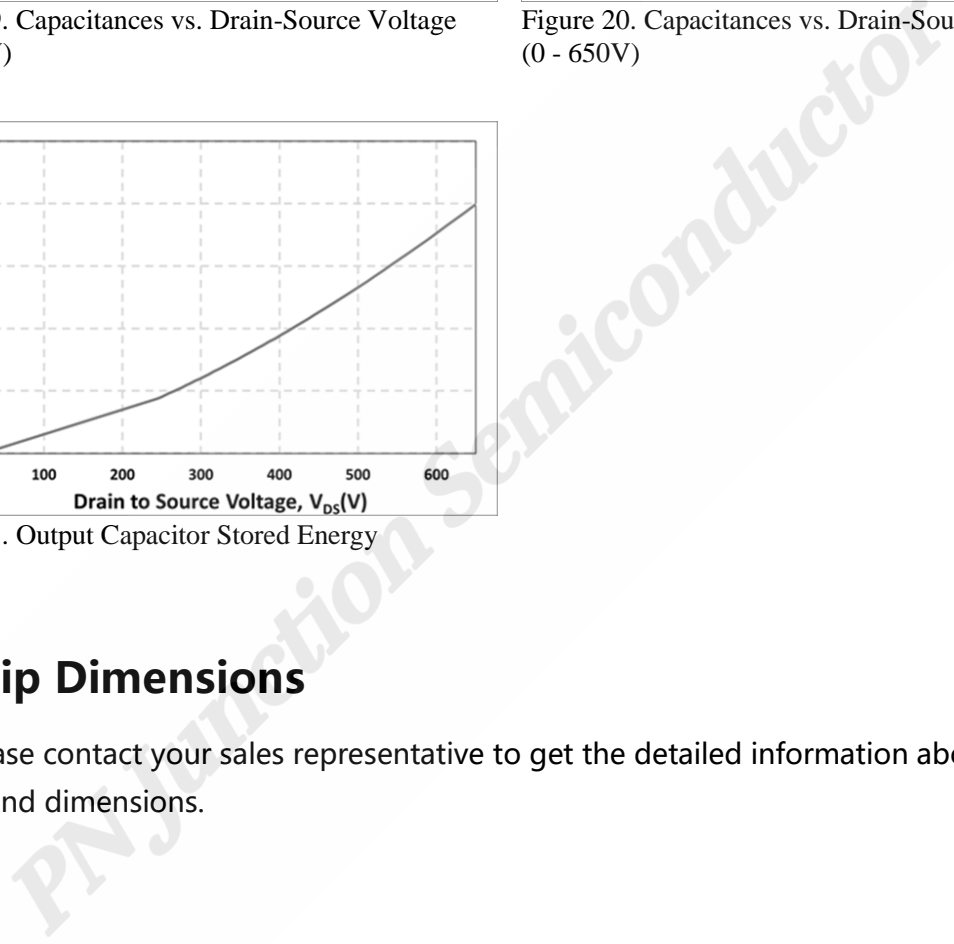


Figure 21. Output Capacitor Stored Energy

5. Chip Dimensions

Please contact your sales representative to get the detailed information about die layout and dimensions.





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