

N1M17001KPN2

Silicon Carbide Power MOSFET

N-Channel Enhancement Mode

V_{DS}	1700V
$I_D @ 25^\circ\text{C}$	5A
$R_{DS(ON)}$	1.0 Ω

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel
- Simple to Drive
- Ultra-Low Drain-Gate Capacitance
- Avalanche Ruggedness

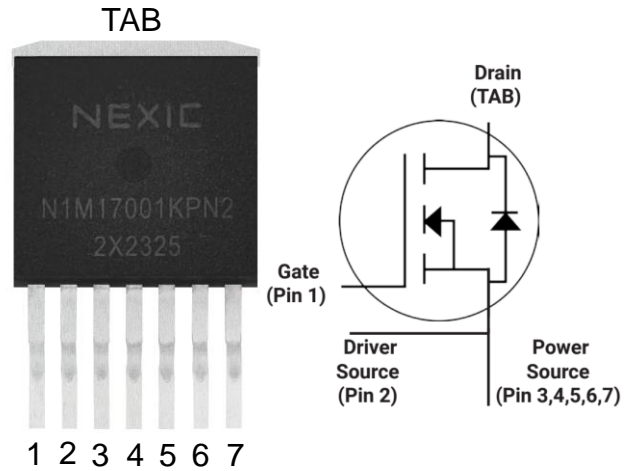
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Auxiliary Power Supplies
- High-Voltage Capacitive
- Switch Mode Power Supplies

Package



Part Number	Package
N1M17001KPN2	TO-263-7

Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	1700	V	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	5.0	A	$V_{GS} = 20\text{ V}, T_C = 25^\circ\text{C}$	
		3.5		$V_{GS} = 20\text{ V}, T_C = 100^\circ\text{C}$	
$I_{D(pulse)}$	Pulsed Drain Current	6.0	A	Pulse width t_p limited by T_{jmax}	
P_D	Power Dissipation	69	W	$T_C=25^\circ\text{C}, T_J=150^\circ\text{C}$	
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to + 150	$^\circ\text{C}$		

Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1700			V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	2.5	3.0	4.5	V	$V_{DS}=V_{GS}, I_D=0.5mA$	Fig.11
			2.2			$V_{DS}=V_{GS}, I_D=0.5mA, T_J=150^{\circ}\text{C}$	
I_{DSS}	Zero Gate Voltage Drain Current		1	100	μA	$V_{DS}=1700V, V_{GS}=0V$	
I_{GSS}	Gate-Source Leakage Current		+10	+250	nA	$V_{GS}=+20V, V_{DS}=0V$	
			-10	-250		$V_{GS}=-10V, V_{DS}=0V$	
$R_{DS(on)}$	Drain-Source On-State Resistance		1.0	1.3	Ω	$V_{GS}=20V, I_D=2A$	Fig.4, 5, 6
			1.5			$V_{GS}=20V, I_D=2A, T_J=150^{\circ}\text{C}$	
g_{fs}	Transconductance		1.15		S	$V_{DS}=20V, I_{DS}=2A$	Fig.7
			1.30			$V_{DS}=20V, I_{DS}=2A, T_J=150^{\circ}\text{C}$	
C_{iss}	Input Capacitance		186		pF	$V_{GS}=0V, V_{DS}=1000V,$ $f=1MHz, V_{AC}=25mV$	Fig.17, 18
C_{oss}	Output Capacitance		12				
C_{rss}	Reverse Transfer Capacitance		1.6				
E_{OSS}	Stored Energy in Output Capacitance		6.2		μJ		Fig.16
E_{ON}	Turn-On Switching Energy		5.2		μJ	$V_{DS}=1200V, V_{GS}=-5/20V, I_D=2A,$ $R_{G(ext)}=2.5\Omega, L=1500\mu H$	
E_{OFF}	Turn Off Switching Energy		9.4				
$t_{d(on)}$	Turn-On Delay Time		13.2		ns	$V_{DS}=1200V, V_{GS}=-5/20V, I_D=2A,$ $R_{G(ext)}=2.5\Omega, L=1500\mu H$	
t_r	Rise Time		22				
$t_{d(off)}$	Turn-Off Delay Time		48				
t_f	Fall Time		18				
$R_{G(int)}$	Internal Gate Resistance		22		Ω	$f=1MHz, V_{AC}=25mV$	
Q_{gs}	Gate to Source Charge		5.2		nC	$V_{DS}=1200V, V_{GS}=-5/20V,$ $I_D=2A$	Fig.12
Q_{gd}	Gate to Drain Charge		7.3				
Q_g	Total Gate Charge		21.8				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test conditions	Note
V_{SD}	Diode Forward Voltage	4.2		V	$V_{GS}=-5V, I_{SD}=1A$	Fig.8, 9, 10
		3.9			$V_{GS}=-5V, I_{SD}=1A, T_J=150^{\circ}\text{C}$	
I_S	Continuous Diode Forward Current		4.0	A	$T_C=25^{\circ}\text{C}$	
t_{rr}	Reverse Recovery Time	25		ns	$I_{SD}=2A, V_R=1200V$	
Q_{rr}	Reverse Recovery Charge	15		nC		
I_{rrm}	Peak Reverse Recovery Current	2.8		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.8		$^{\circ}\text{C/W}$		
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient		40			

Typical Performance

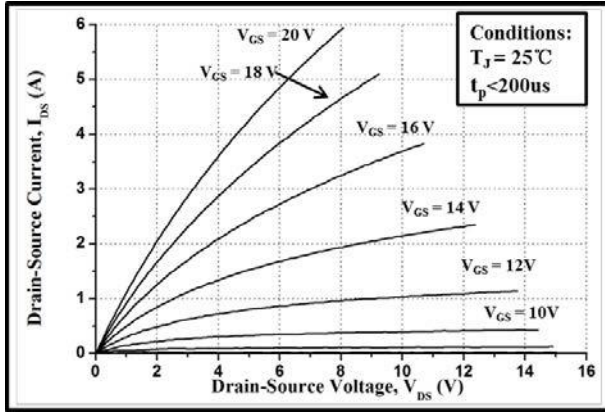


Figure 1. Output Characteristics $T_j = 25\text{ }^\circ\text{C}$

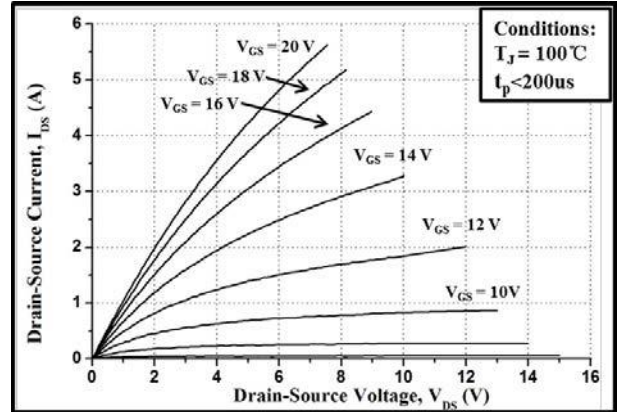


Figure 2. Output Characteristics $T_j = 100\text{ }^\circ\text{C}$

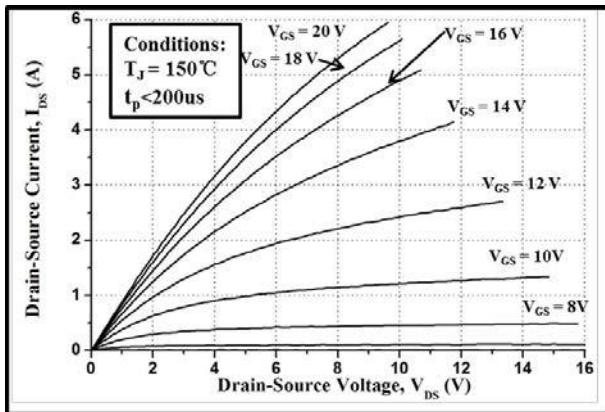


Figure 3. Output Characteristics $T_j = 150\text{ }^\circ\text{C}$

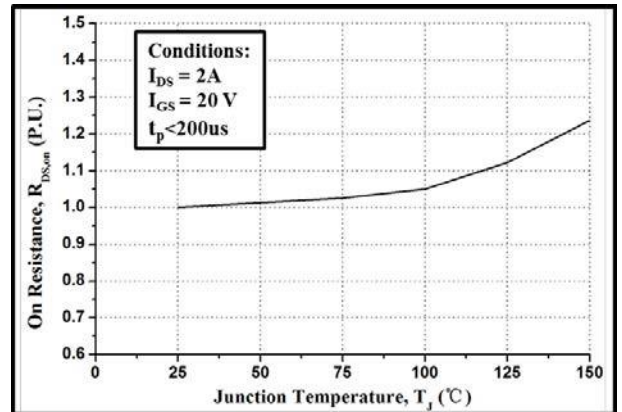


Figure 4. Normalized On-Resistance vs. Temperature

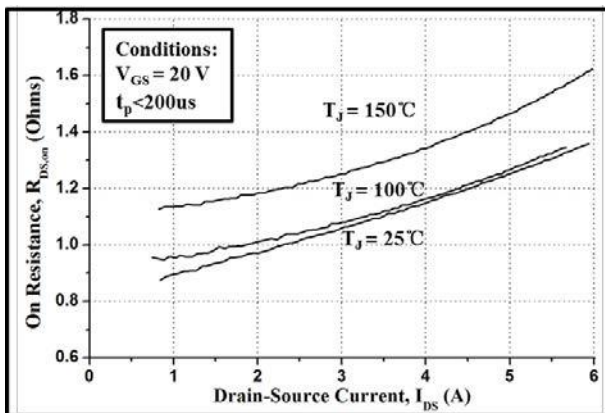


Figure 5. On-Resistance vs. Drain Current for Various Temperatures

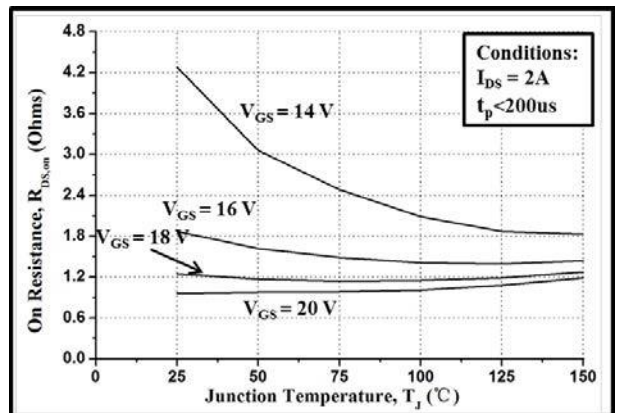


Figure 6. On-Resistance vs. Temperature for Various Gate Voltage

Typical Performance

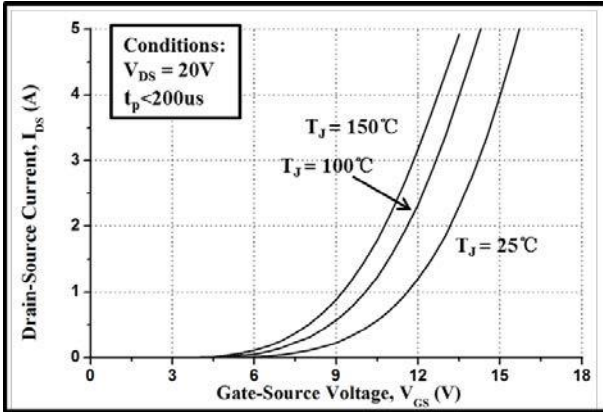


Figure 7. Transfer Characteristics for Various Junction Temperatures

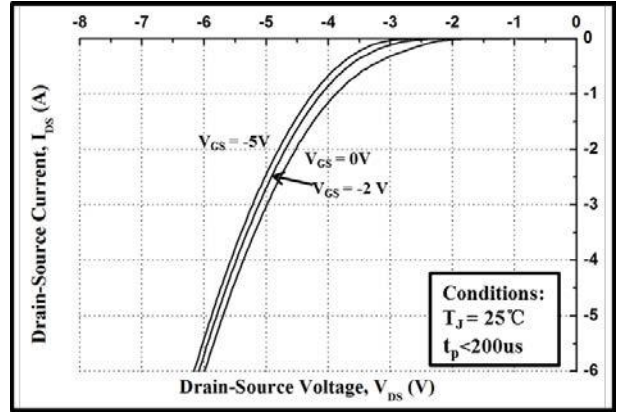


Figure 8. Body Diode Characteristics at 25 °C

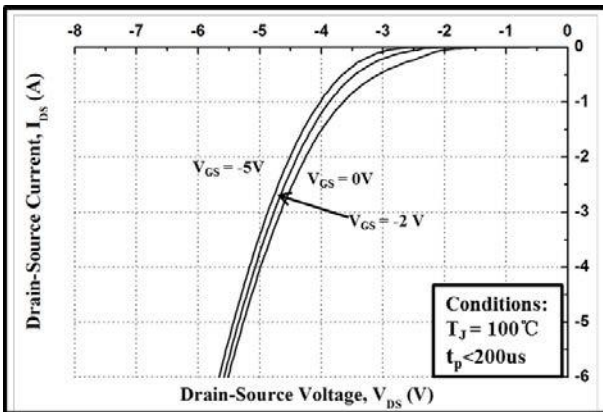


Figure 9. Body Diode Characteristics at 100 °C

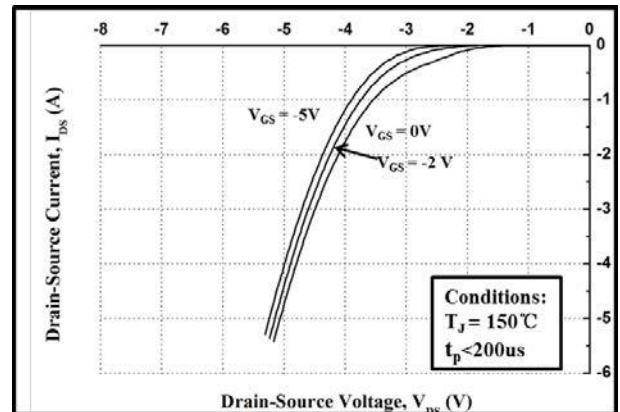


Figure 10. Body Diode Characteristics at 150 °C

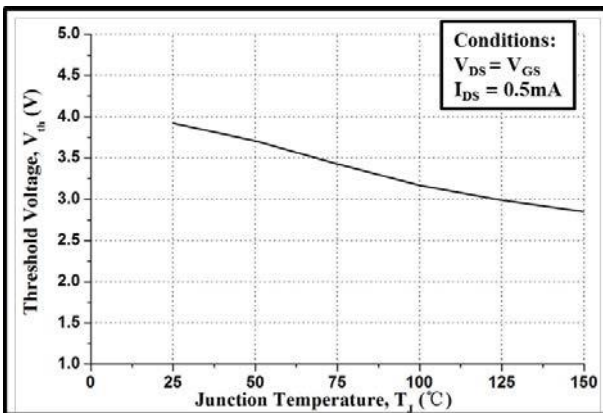


Figure 11. Threshold Voltage vs. Temperature

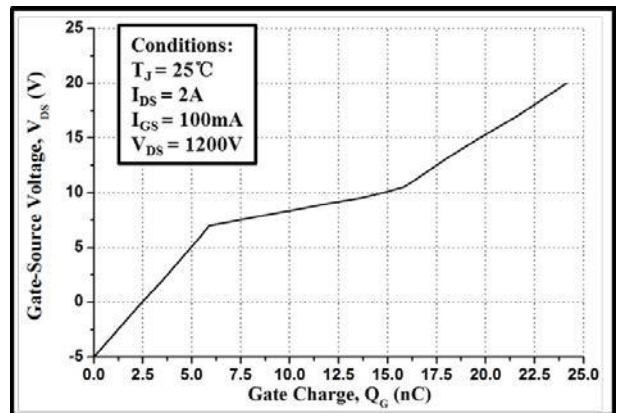


Figure 12. Gate Charge Characteristics

Typical Performance

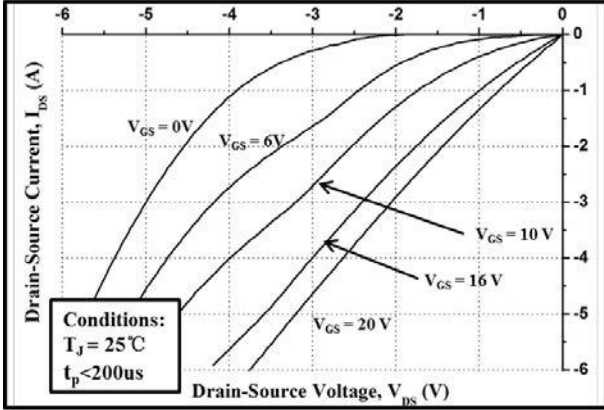


Figure 13. 3rd Quadrant Characteristic at 25 °C

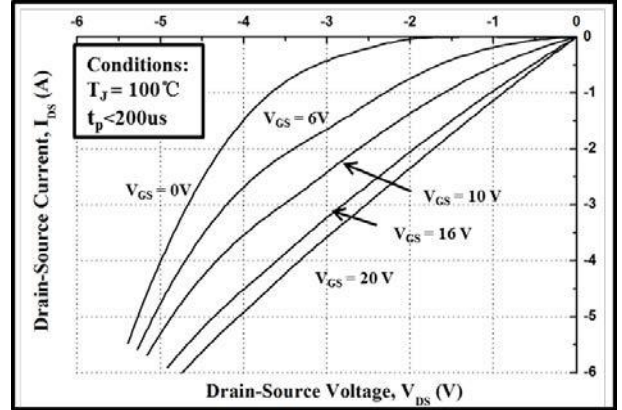


Figure 14. 3rd Quadrant Characteristic at 100 °C

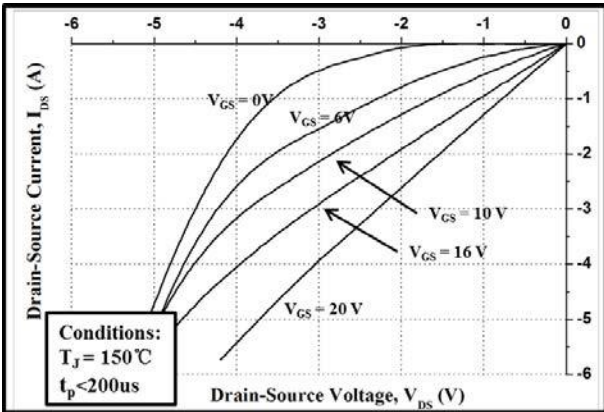


Figure 15. 3rd Quadrant Characteristic at 150 °C

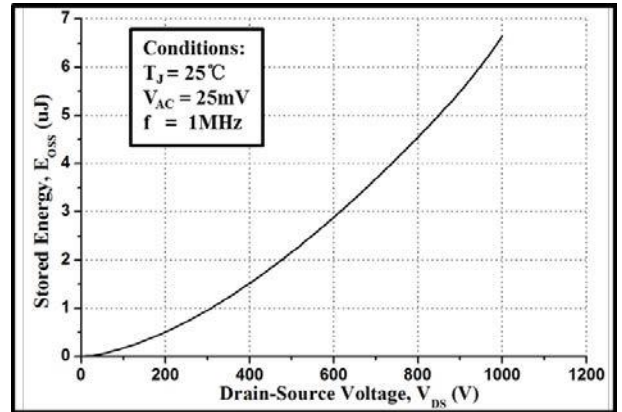


Figure 16. Output Capacitor Stored Energy

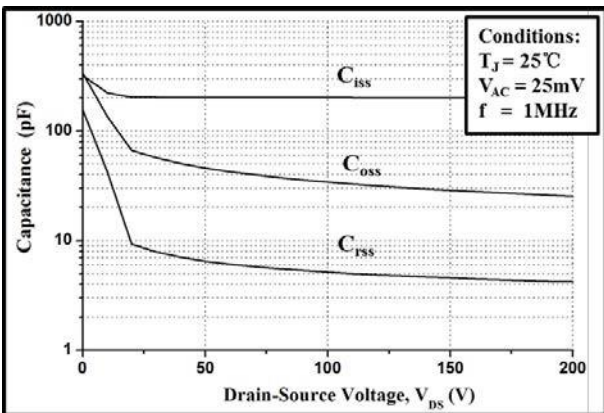


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

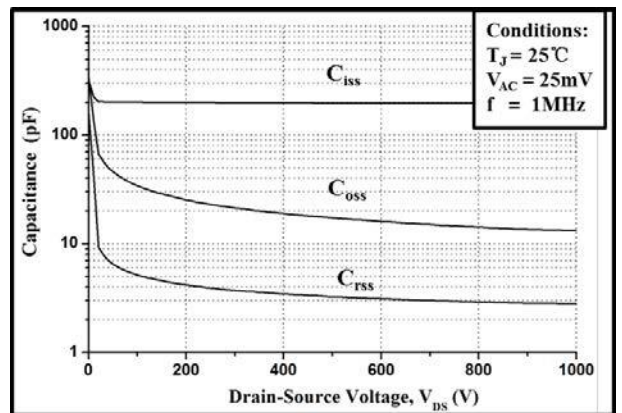
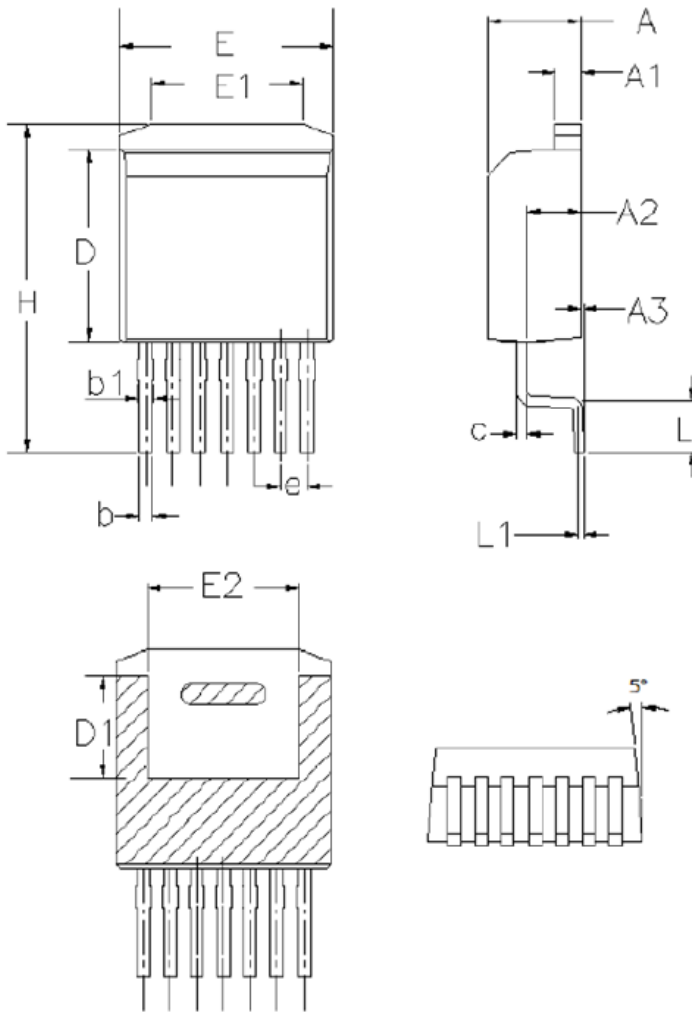


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Package TO-263-7



	mm		
	MIN	NOM	MAX
A	4.30	4.43	4.56
A1	1.2	1.3	1.4
A3	0	0.13	0.25
b	0.5	0.6	0.7
b1	0.6	0.7	0.9
c	0.45	0.50	0.60
D	8.93	9.08	9.23
D1	4.65	4.80	4.95
e	/	1.27	/
E	10.08	10.18	10.28
E1	6.5	7.0	7.5
E2	6.82	7.22	7.62
H	15.0	15.5	16.0
L	1.9	2.2	2.5