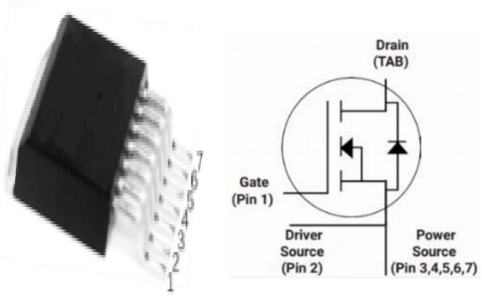
NF3M80120J

N-Channel Silicon Carbide Power MOSFET

Product Summary

V_{DS} = 1200 V
I_D@25°C = 32A
$R_{DS(ON)}$ = 80mΩ



TO-263-7

Features

- Qualified to AEC-Q101
- High Blocking Voltage with Low On-Resistance
- High-Frequency Operation
- Ultra-Small Qgd
- 100% UIS tested

Applications

- Solar Inverters
- EV Battery Chargers
- Reduce Heat Sink Requirements
- Reduction of System Cost

Standards Benefits

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

Drain	TAB
Gate	1
Driver Source	2
Power Source	3~7

Maximum Ratings (T

Parameter	Symbol	Test conditions	Value	Unit
Drain - Source Voltage	V_{DSmax}	V_{GS}=-3V, I_D=100μA	1200	V
Gate - Source Voltage (dynamic)	V_{GSmax}	AC (f >1Hz)	-8 / +19	V
Gate - Source Voltage (static)	$V_{GSmax（op）}$	Static	-3 / +15	V
Continuous Drain Current	I_D	V_{GS} = 15V, T_C=25°C V_{GS} = 15V, T_C=100°C	32 23	A
Total power dissipation	P_D	T_C=25°C	136	W
Storage temperature range	T_{STG}		-55 to 175	°C
Operating Junction Temperature	T_J		-55 to 175	°C
Solder Temperature	T_L		260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Electrical Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}= -3V, I_D= 100μA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 30mA	1.8	2.2		V
		V_{DS} = V_{GS}, I_D = 30mA, @T_C = 175°C		1.45		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200V, V_{GS} = -3V		0.14	10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 15V, I_D = 20 A		20	250	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 20V, I_D = 10 A @T_J = 25°C		80	96	mΩ
		V_{GS} = 15V, I_D = 20 A @T_J = 125°C		80		
		V_{GS} = 15V, I_D = 20 A @T_J = 175°C		80		
Input capacitance	C_{iss}	V_{DS} = 800V, V_{GS} = 0V f = 1MHz,V_{AC}=25mV		2070		pF
Output capacitance	C_{oss}			78		
Reverse transfer capacitance	C_{rss}			8		
C_{oss} Stored Energy	E_{oss}			53.1		μJ
Total gate charge	Q_g	V_{DS} = 800V,V_{GS} = -3V to 15V I_D = 20mA,		57.2		nC
Gate-source charge	Q_{gs}			20.8		
Gate-drain charge	Q_{gd}			13.5		
Internal gate input resistance	$R_{g(int)}$	f = 1MHz, V_{AC}=25mV		1.76		Ω
Trans conductance	gfs	V_{DS}= 20V, I_{DS}= 20A T_J= 25℃		10.6		S
		V_{DS}= 20V, I_{DS}= 20A T_J= 175℃		11.5		

Reverse Diode Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_{SD}	V_{GS} = -3V, I_{SD} = 10A,		4.8		V
		V_{GS} = -3V, I_{SD} = 10A, T_J = 175°C		4.6		
Reverse Recovery time	I_S	V_{GS} = -3V		22		A

Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal Resistance	$R_{th(j-c)}$	junction-case		1.1		^{0}C/W

Typical Performance

(T_C=25°C unless otherwise specified)

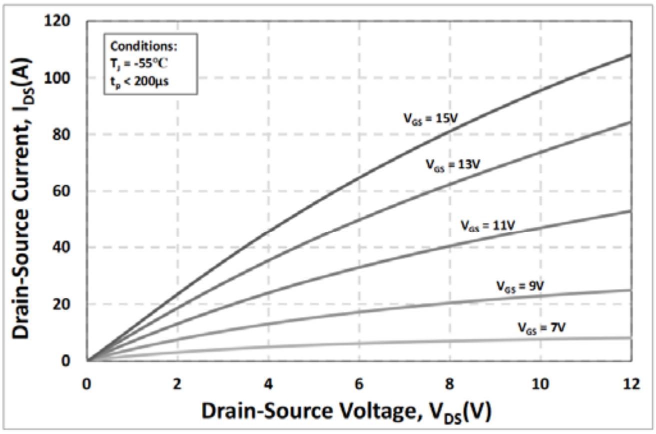


Figure 1. Output Characteristics T_J = -55°C

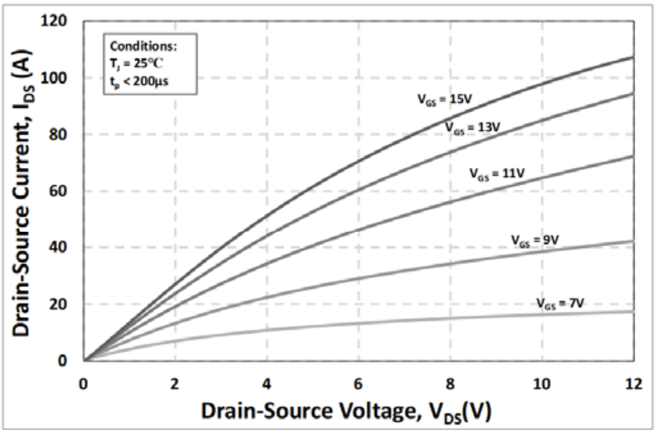


Figure 2. Output Characteristics T_J = 25°C

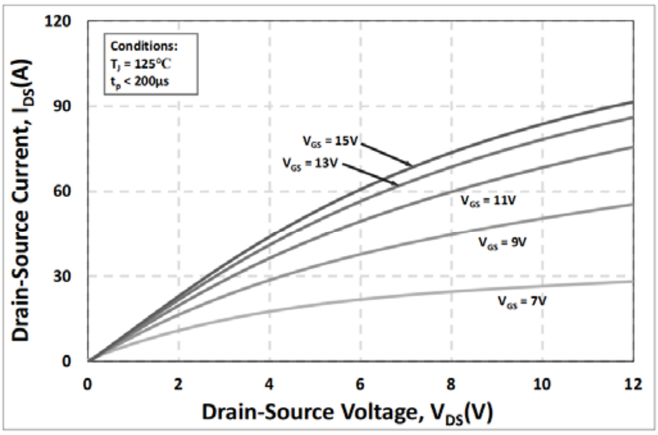


Figure 3. Output Characteristics T_J = 125°C

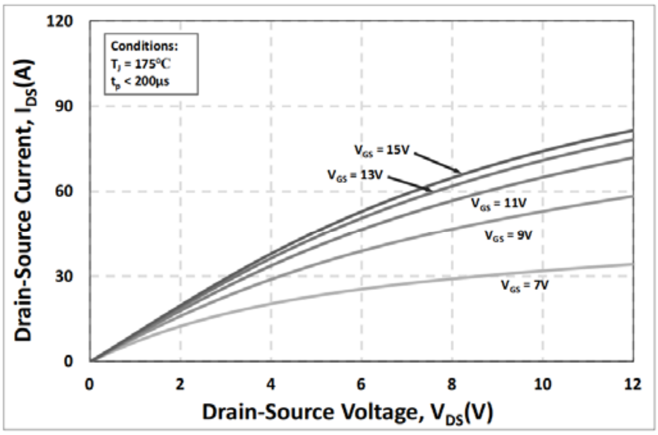


Figure 4. Output Characteristics T_J = 175°C

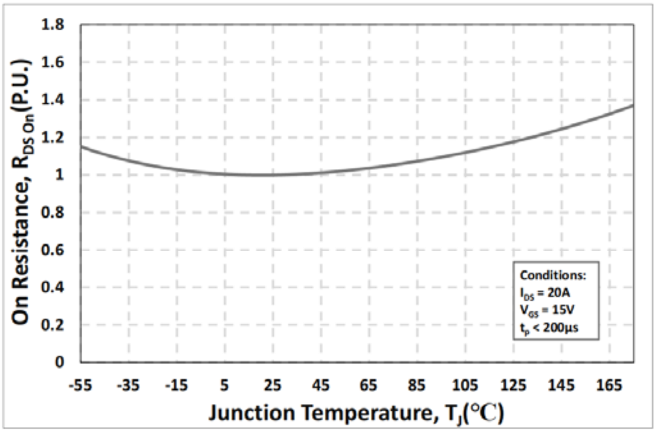


Figure 5. Normalized On-Resistance vs. Temperature

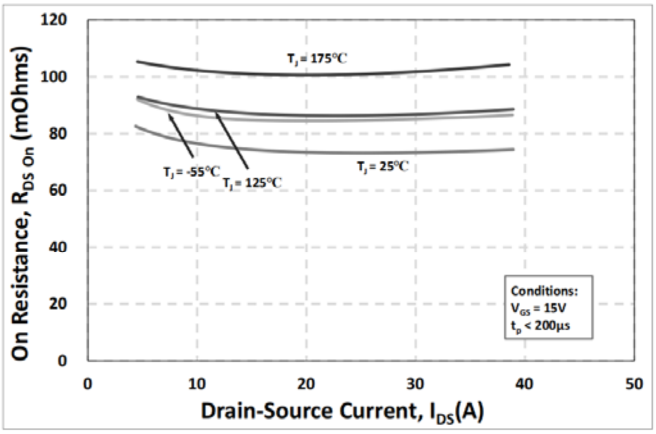


Figure 6. On-Resistance vs. Drain Current Various Temperatures

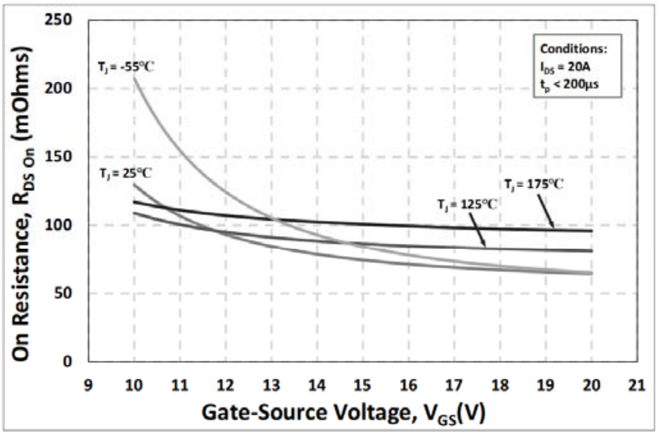


Figure 7. On-Resistance vs. Gate-Source Voltage

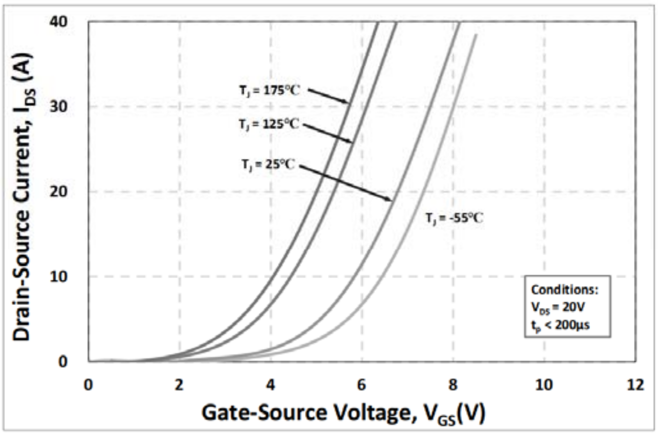


Figure 8. Transfer Characteristic for Various Junction Temperatures

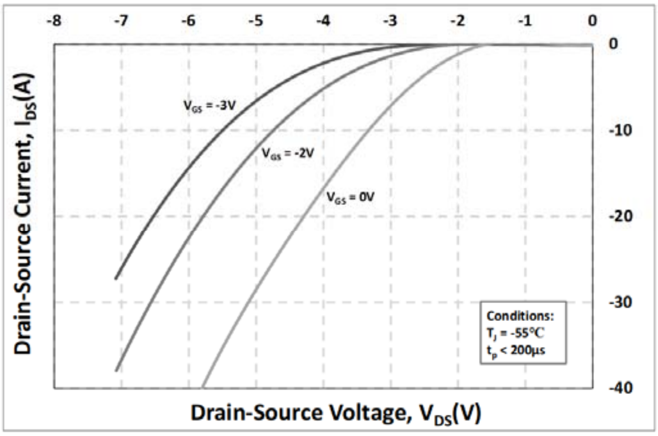


Figure 9. Body Diode Characteristic at -55°C

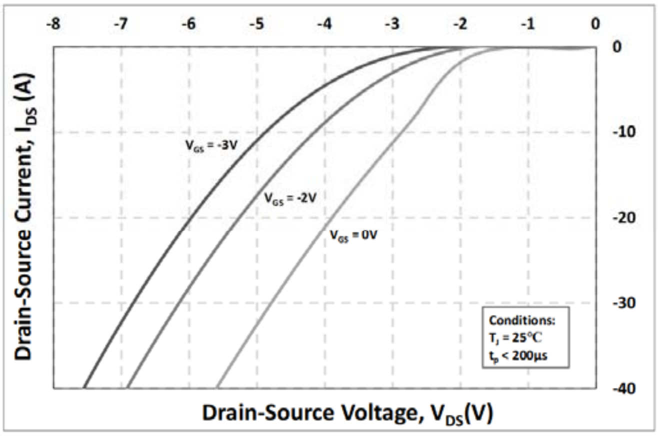


Figure 10. Body Diode Characteristic at 25°C

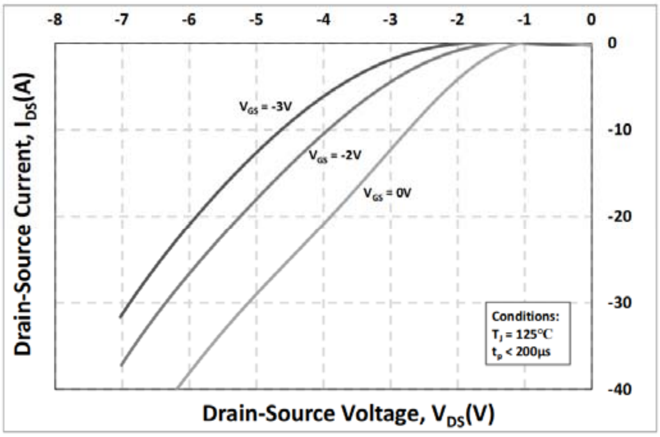


Figure 11. Body Diode Characteristic at 125°C

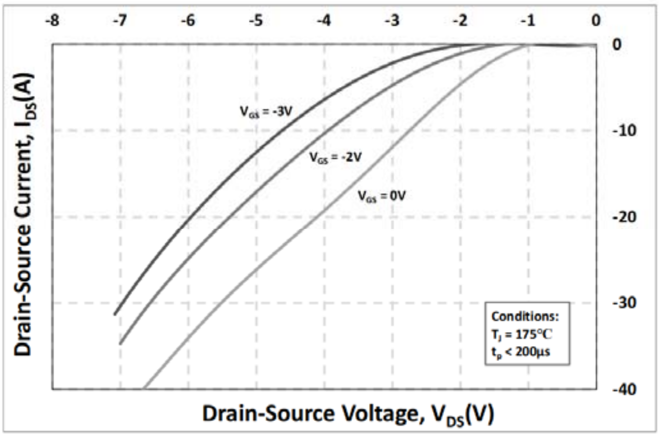


Figure 12. Body Diode Characteristic at 175°C

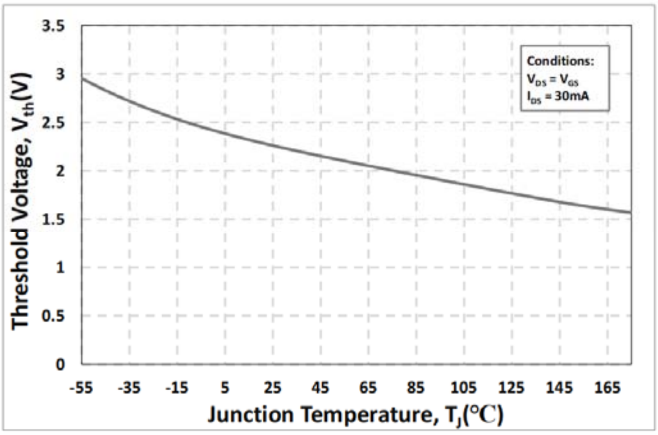


Figure 13. Threshold Voltage vs. Temperature

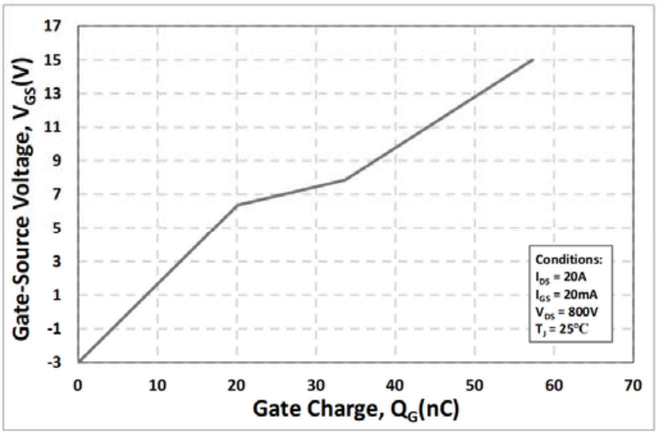


Figure 14. Gate Charge Characteristics

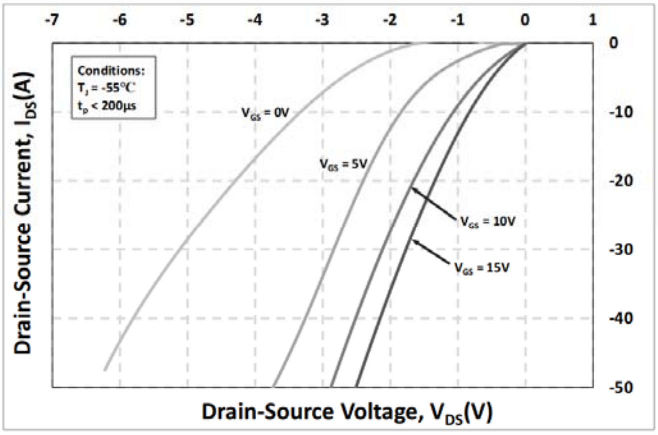


Figure 15. 3rd Quadrant Characteristic at -55°C

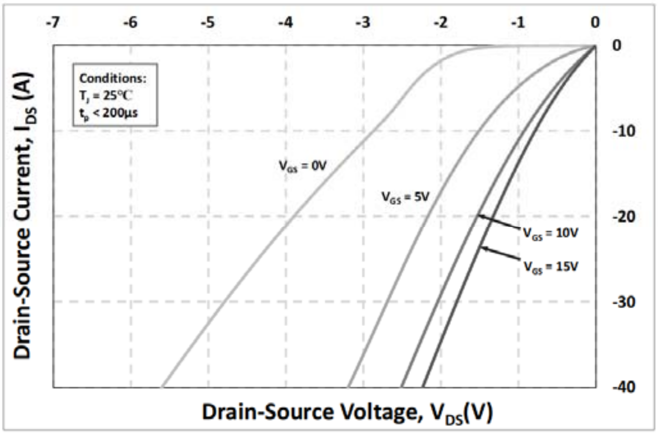


Figure 16. 3rd Quadrant Characteristic at 25°C

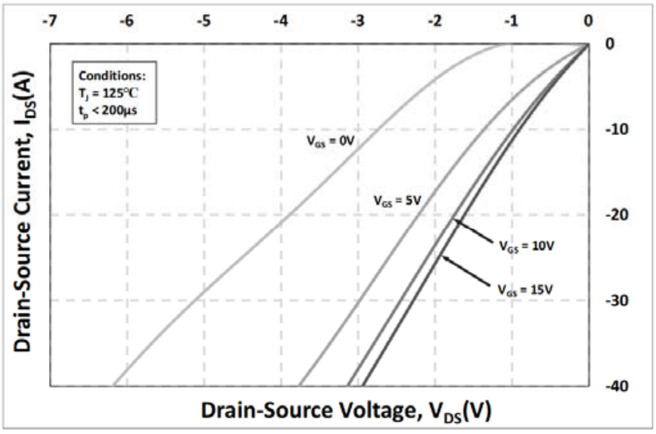


Figure 17. 3rd Quadrant Characteristic at 125°C

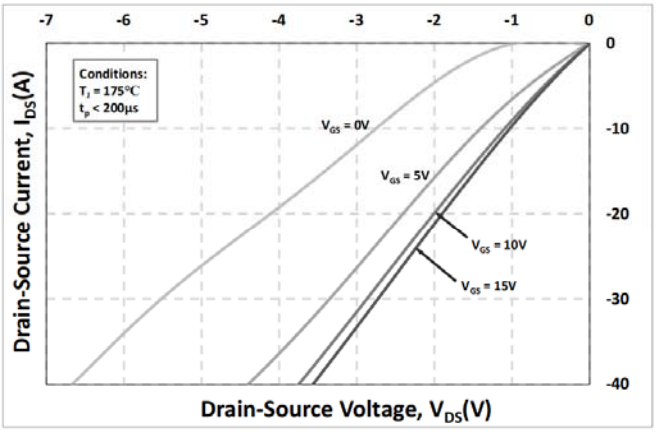


Figure 18. 3rd Quadrant Characteristic at 175°C

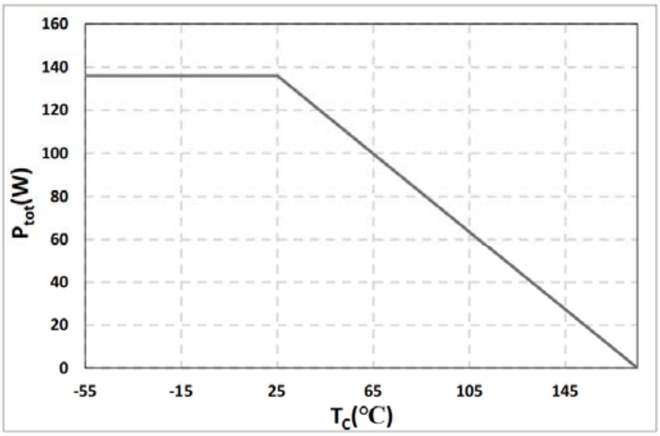


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

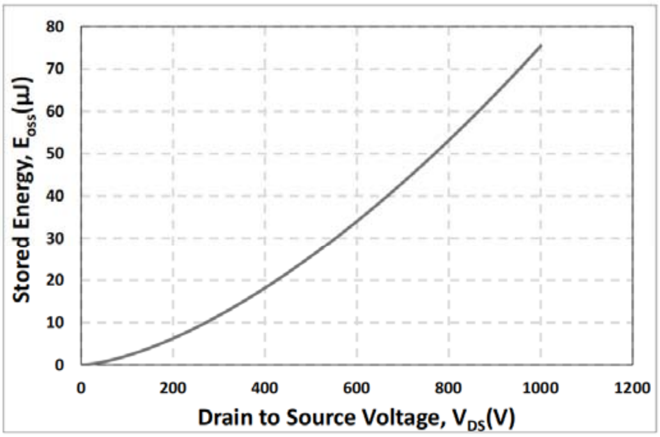


Figure 20. Output Capacitor Stored Energy

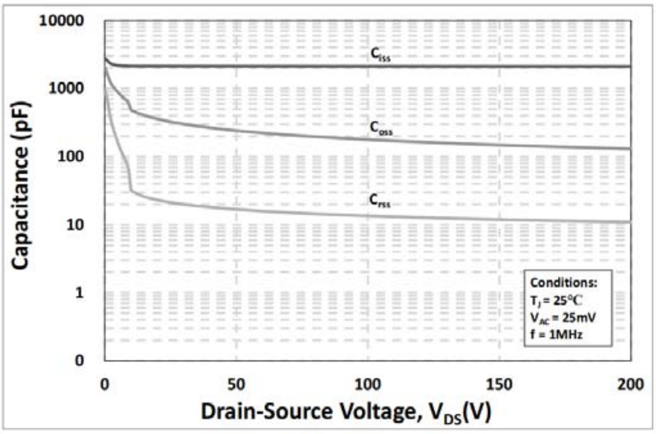


Figure 21. Capacitances vs. Drain-Source Voltage (0 - 200V)

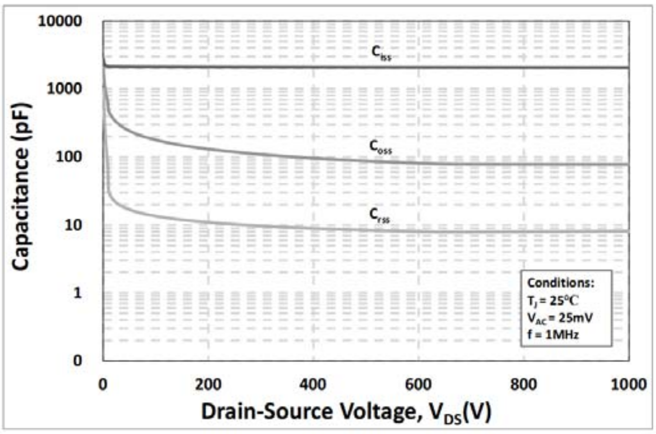
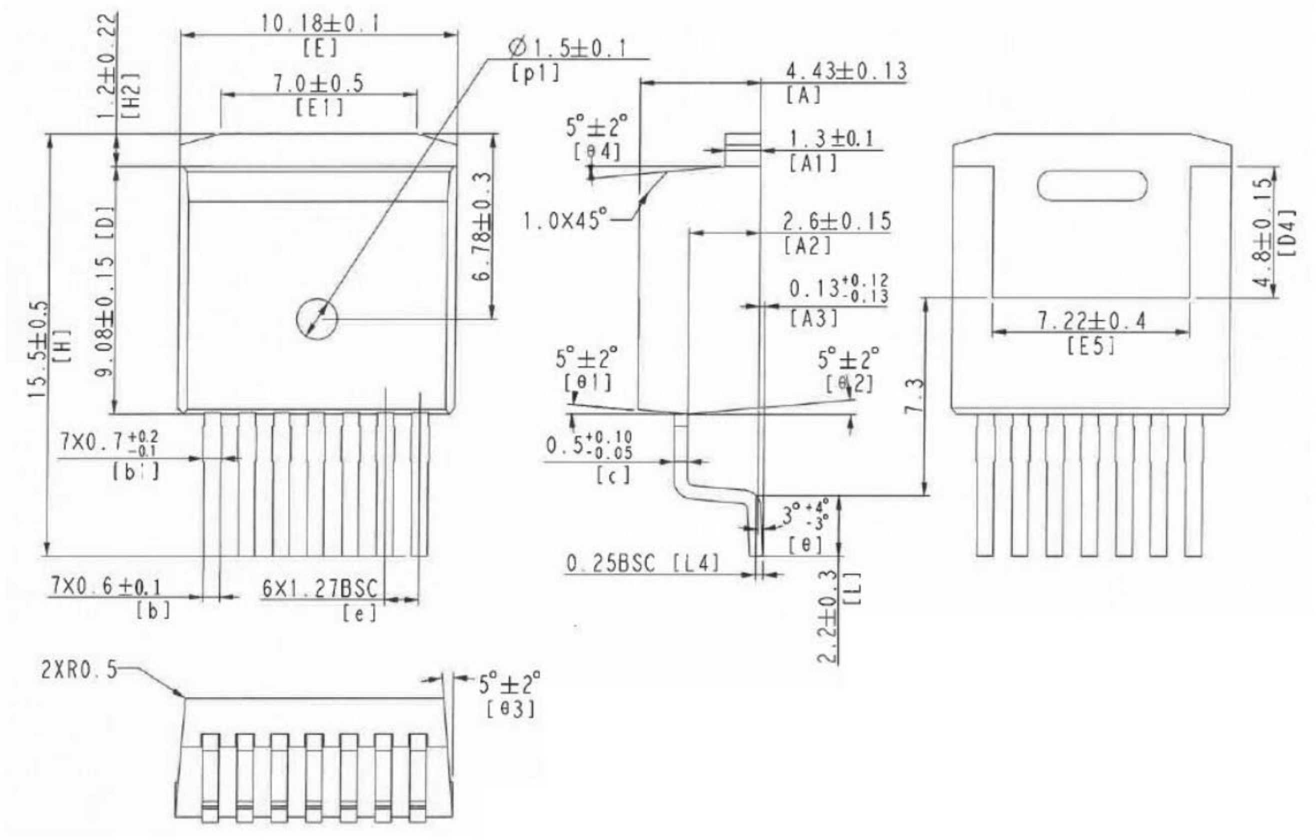


Figure 22. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Package Dimensions

(TO-63-3 Package)



Drawing and dimensions