

320N20N-VB TO262 Datasheet

N-Channel 200-V (D-S) MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
200	0.038 at $V_{GS} = 15$ V	45	57
	0.043 at $V_{GS} = 10$ V	40	

FEATURES

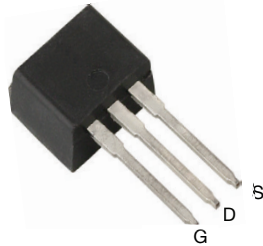
- Trench Power MOSFETS
- 175 °C Junction Temperature
- 100 % R_g and UIS Tested


RoHS
 COMPLIANT

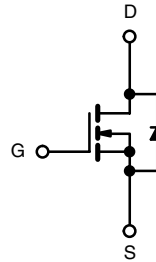
APPLICATIONS

- Power Supply
- Lighting Systems

TO-262



Top View



N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	± 25	
Continuous Drain Current ($T_J = 175$ °C)	I_D	45	A
		26	
Pulsed Drain Current	I_{DM}	150	
Single Pulse Avalanche Current	I_{AS}	20	
Single Pulse Avalanche Energy ^a	E_{AS}	20	mJ
Maximum Power Dissipation ^a	P_D	166 ^b	W
		3.12	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.75	

Notes:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

c. When Mounted on 1" square PCB (FR-4 material).

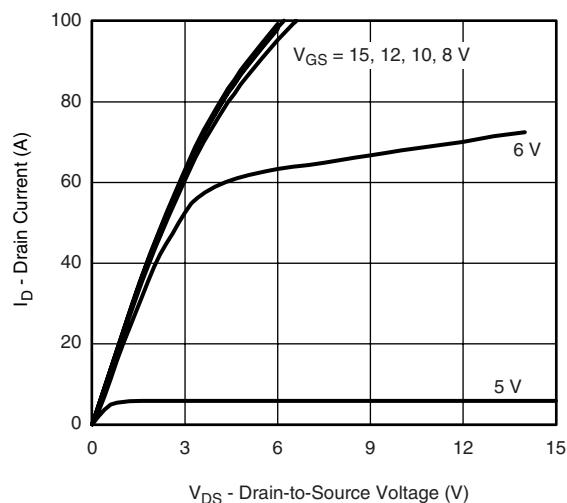
SPECIFICATIONS T _J = 25 °C, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	200			V	
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.5		4.5		
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA	
		V _{DS} = 0 V, V _{GS} = ± 25 V			± 300		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V			1	μA	
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 100 °C			25		
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 150 °C			250		
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	40			A	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.038		Ω	
		V _{GS} = 15 V, I _D = 20 A		0.043			
		V _{GS} = 10 V, I _D = 20 A, T _J = 100 °C		0.088			
		V _{GS} = 10 V, I _D = 20 A, T _J = 150 °C		0.120			
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A	25			S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		3100		pF	
Output Capacitance	C _{oss}			300			
Reverse Transfer Capacitance	C _{rss}			135			
Total Gate Charge ^c	Q _g	V _{DS} = 100 V, V _{GS} = 15 V, I _D = 50 A		85	127	nC	
		V _{DS} = 100 V, V _{GS} = 10 V, I _D = 50 A		57	85		
	Gate-Source Charge ^c		Q _{gs}		14		
	Gate-Drain Charge ^c		Q _{gd}		20		
Gate Resistance	R _g	f = 1 MHz		1.2	1.8	Ω	
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 100 V, R _L = 2 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω		16	25	ns	
Rise Time ^c	t _r			170	260		
Turn-Off Delay Time ^c	t _{d(off)}			27	42		
Fall Time ^c	t _f			9	18		
Source-Drain Diode Ratings and Characteristics T _C = 25 °C							
Continuous Current	I _S				36	A	
Pulsed Current	I _{SM}				80		
Forward Voltage ^a	V _{SD}	I _F = 20 A, V _{GS} = 0 V		0.86	1.5	V	
Reverse Recovery Time	t _{rr}	I _F = 40 A, di/dt = 100 A/μs		116	175	ns	
Peak Reverse Recovery Current	I _{RM(REC)}			9	14	A	
Reverse Recovery Charge	Q _{rr}			0.53	0.8	μC	
Reverse Recovery Fall Time	t _a			84		nS	
Reverse Recovery Rise Time	t _b			32			

Notes:

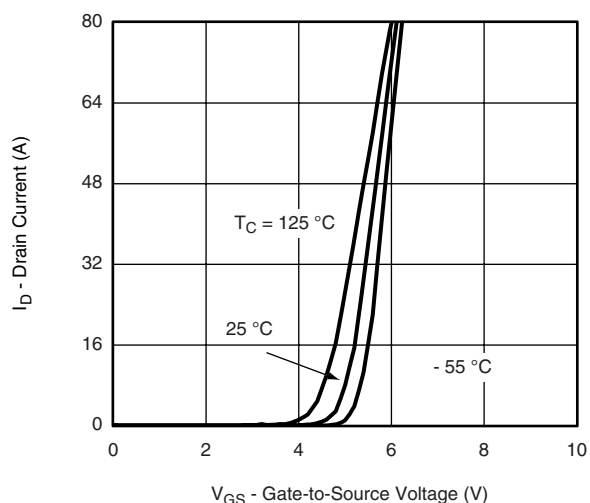
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

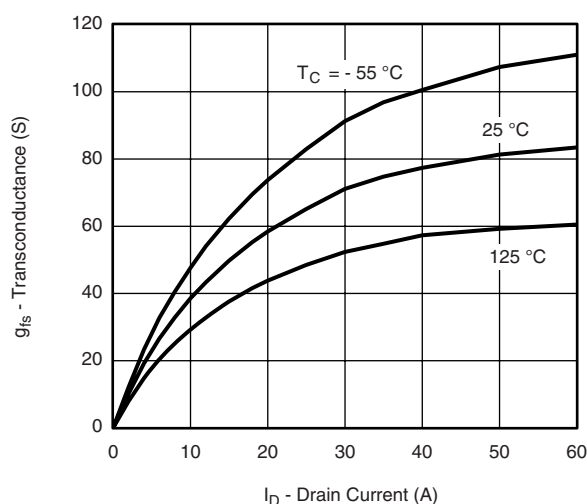
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



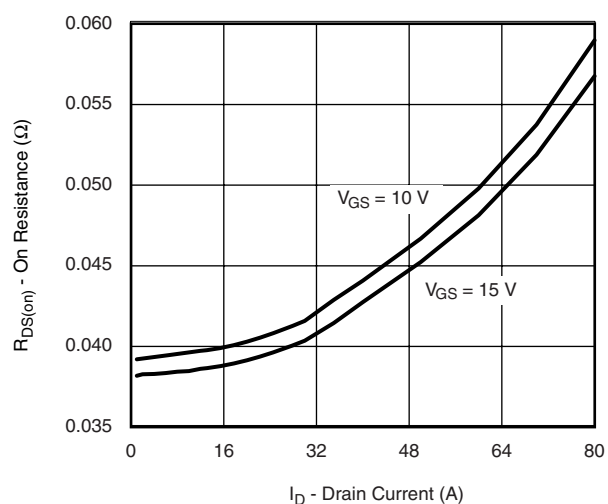
Output Characteristics



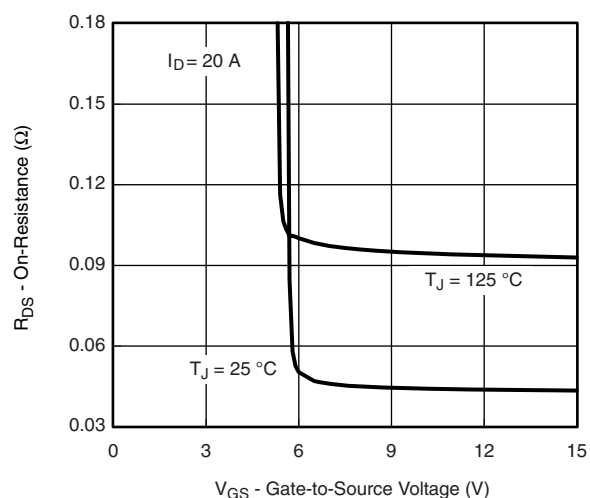
Transfer Characteristics



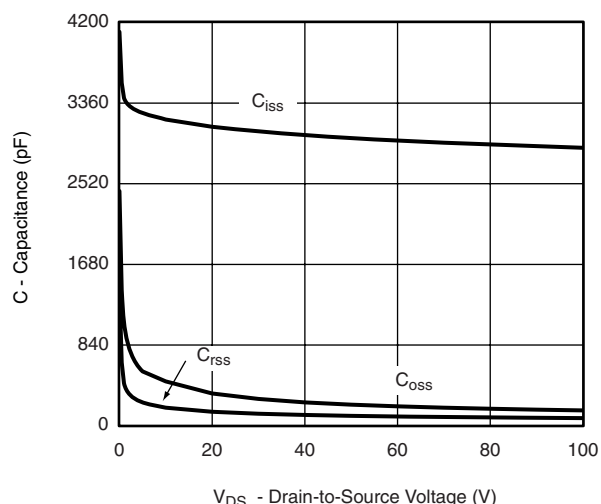
Transconductance



On-Resistance vs. Drain Current

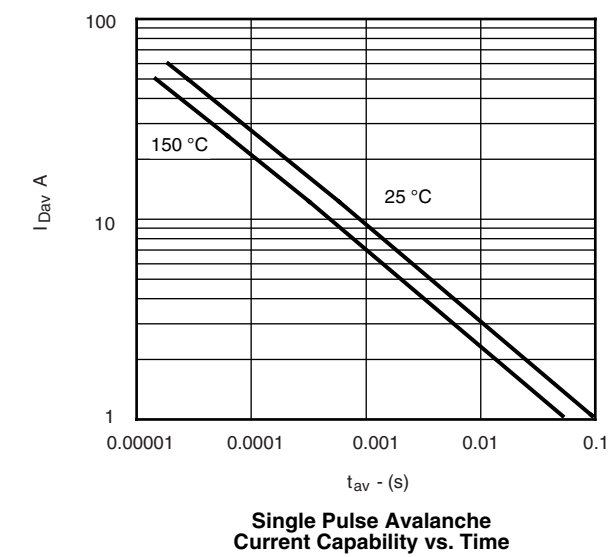
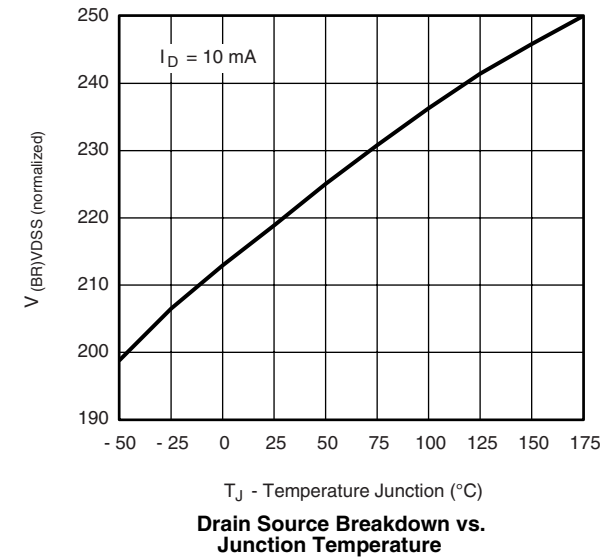
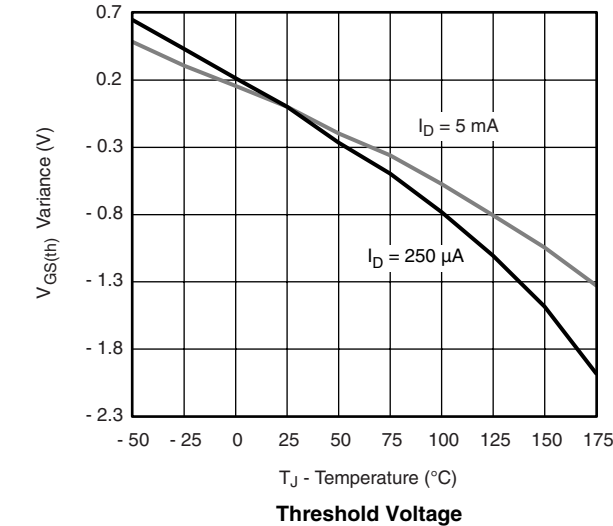
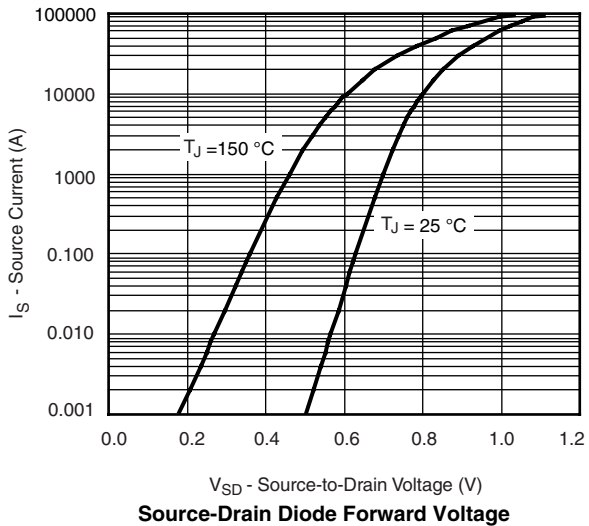
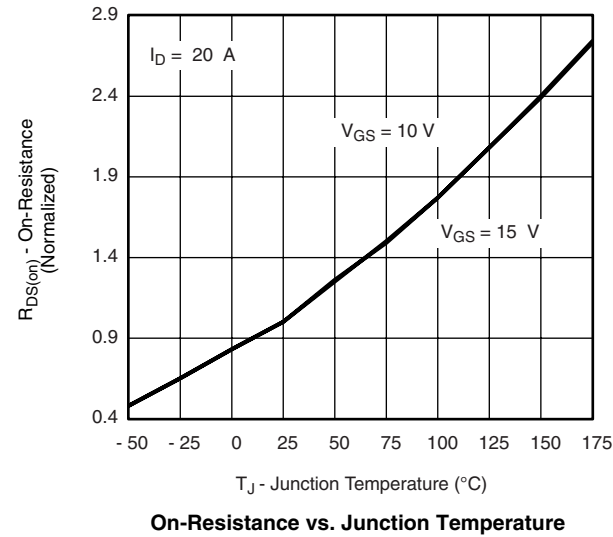
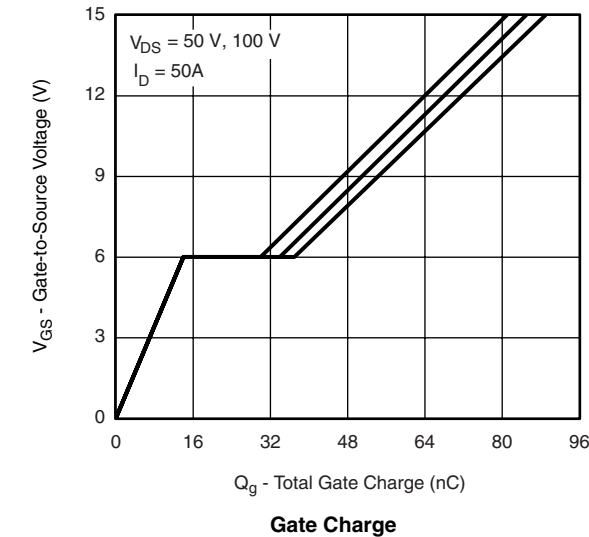


On-Resistance vs. Gate-to-Source Voltage

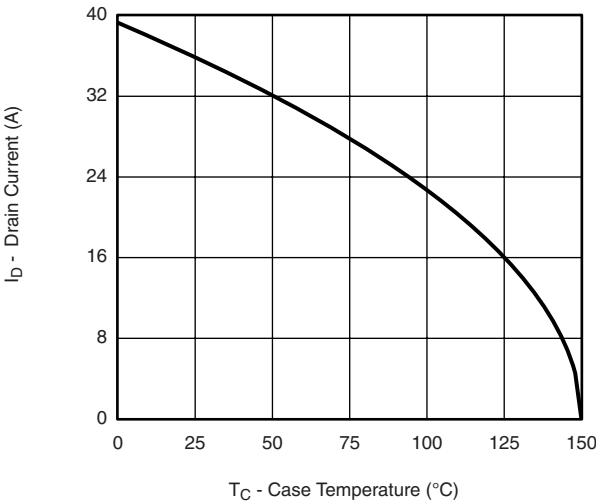


Capacitance

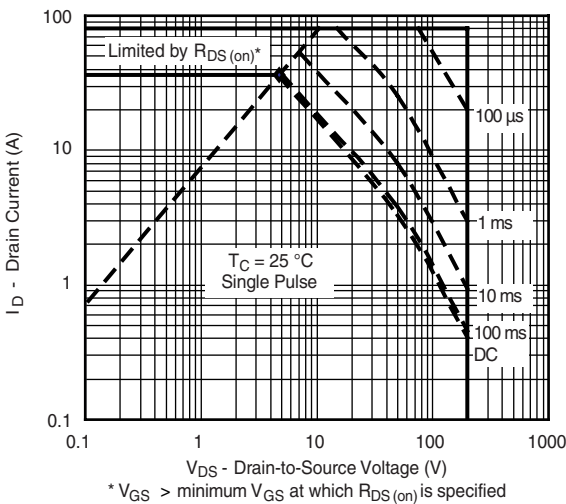
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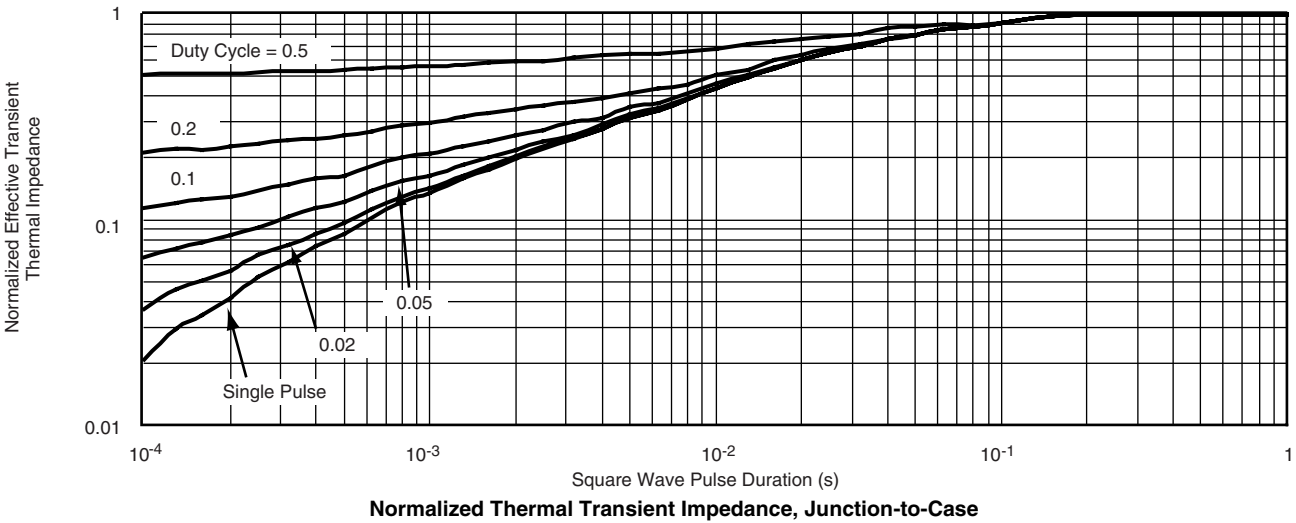
THERMAL RATINGS



Maximum Drain Current vs. Case Temperature

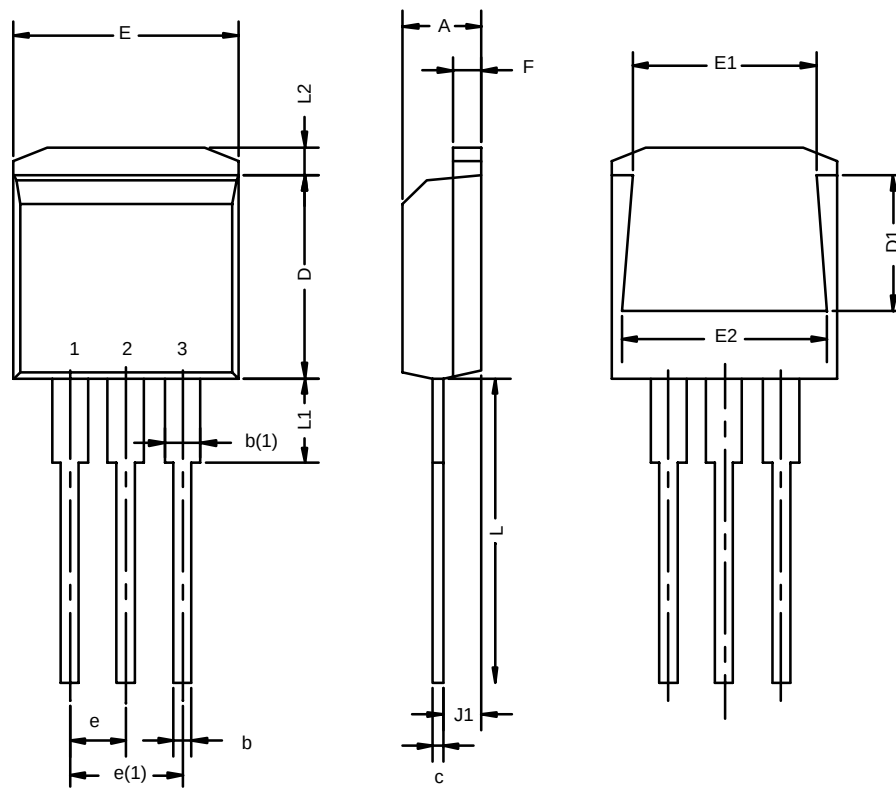


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-262: 3-LEAD



Dim	MILLIMETERS*		INCHES	
	Min	Max	Min	Max
A	4.32	4.70	0.170	0.185
b	0.64	1.00	0.025	0.039
b(1)	1.14	1.40	0.045	0.055
c	0.36	0.50	0.014	0.020
D	8.64	9.65	0.340	0.380
D1	5.59	6.10	0.220	0.240
e	2.41	2.67	0.095	0.105
e(1)	4.95	5.33	0.195	0.210
E	10.03	10.41	0.395	0.410
E1	7.87	8.64	0.310	0.340
E2	9.02	9.53	0.355	0.375
F	1.14	1.40	0.045	0.055
J1	2.41	2.79	0.095	0.110
L	13.08	14.22	0.515	0.560
L1	-	3.81	-	0.150
L2	1.02	1.40	0.040	0.055

ECN: T-02234—Rev. C, 14-Oct-02
DWG: 5855

*Use millimeters as the primary measurement

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