IRF640NL-VB 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

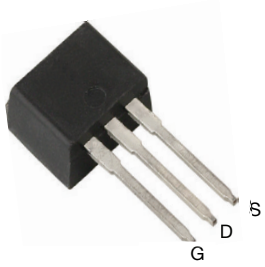
- Trench Power MOSFETS
- 175 °C Junction Temperature
- 100 % R_g and UIS Tested

RoHS COMPLIANT

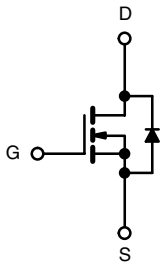
APPLICATIONS

- 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)	T_C = 25 °C	I_D	45	A
	T_C = 100 °C		26	
Pulsed Drain Current		I_{DM}	150	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	20	
Single Pulse Avalanche Energy[a]		E_{AS}	20	mJ
Maximum Power Dissipation[a]	T_C = 25 °C	P_D	166[b]	W
	T_A = 25 °C[c]		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	

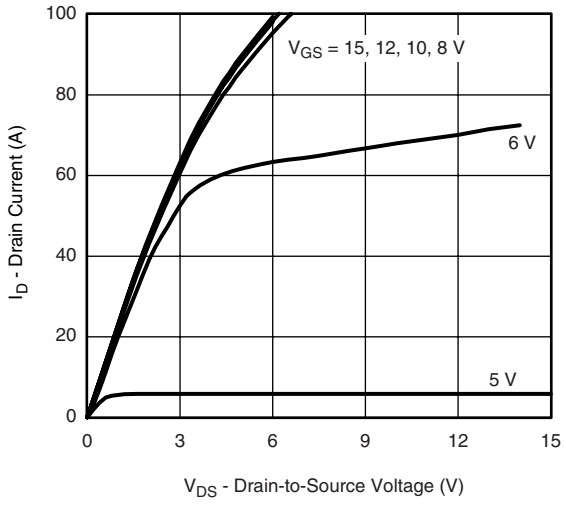
Notes:
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When Mounted on 1" square PCB (FR-4 material).

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		

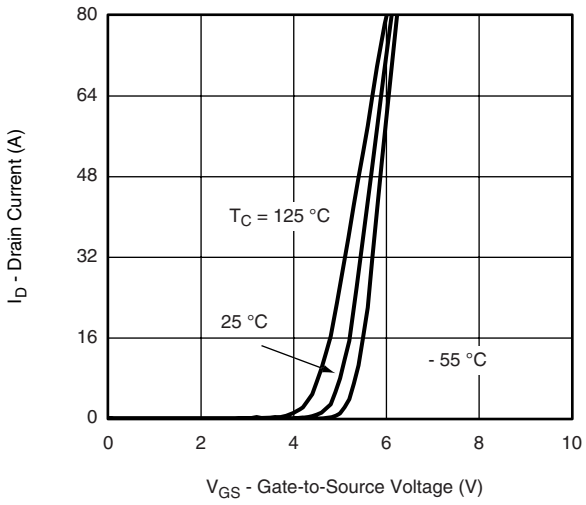
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

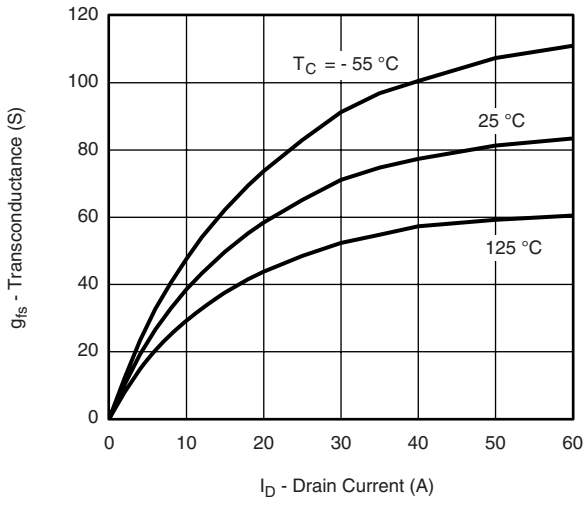
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



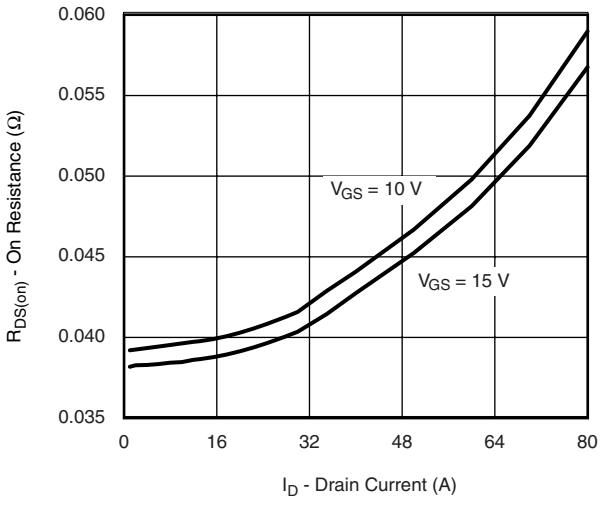
Output Characteristics



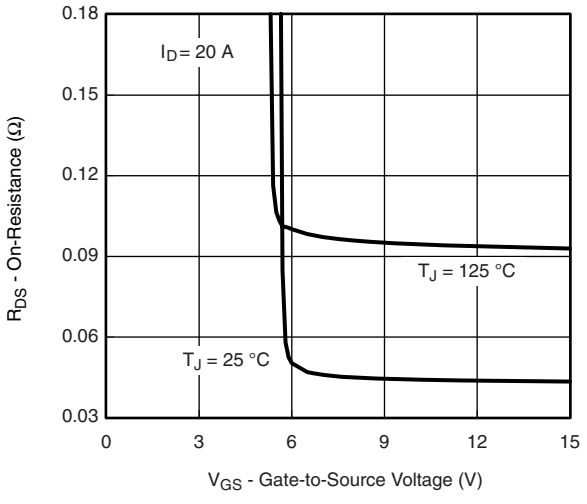
Transfer Characteristics



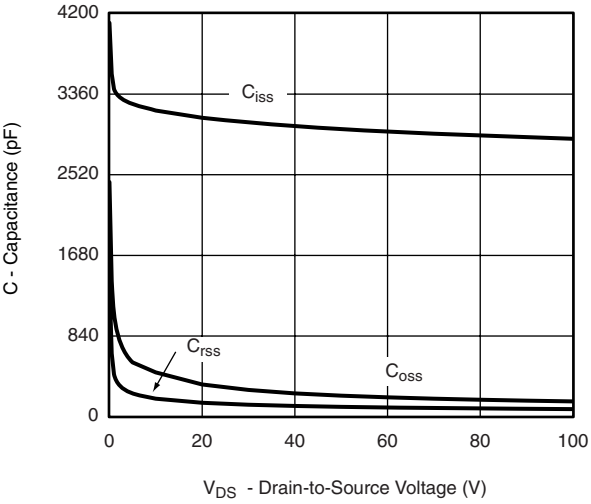
Transconductance



On-Resistance vs. Drain Current

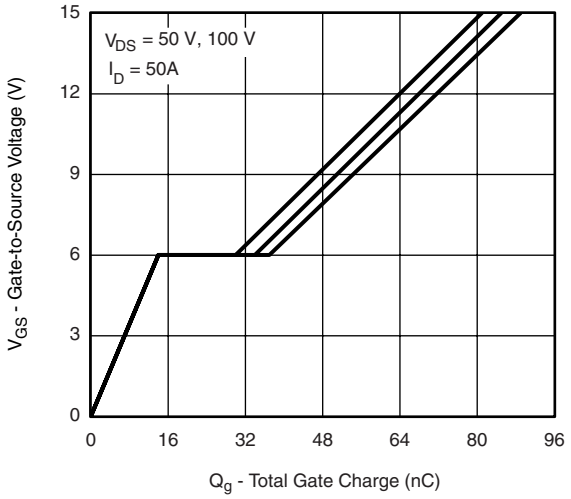


On-Resistance vs. Gate-to-Source Voltage

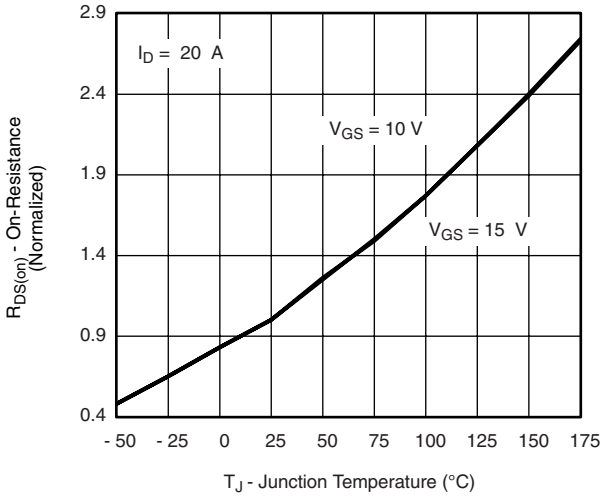


Capacitance

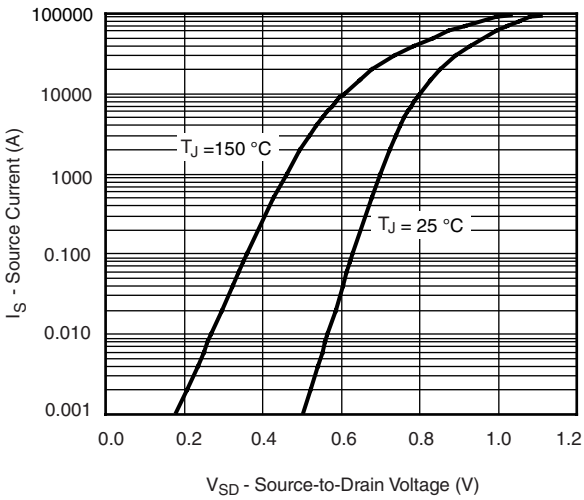
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



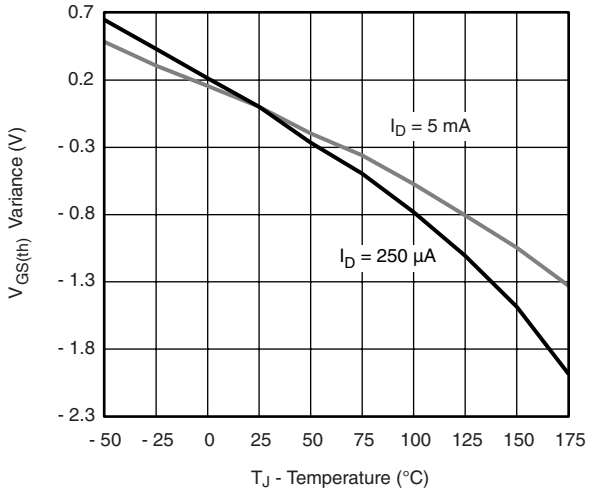
Gate Charge



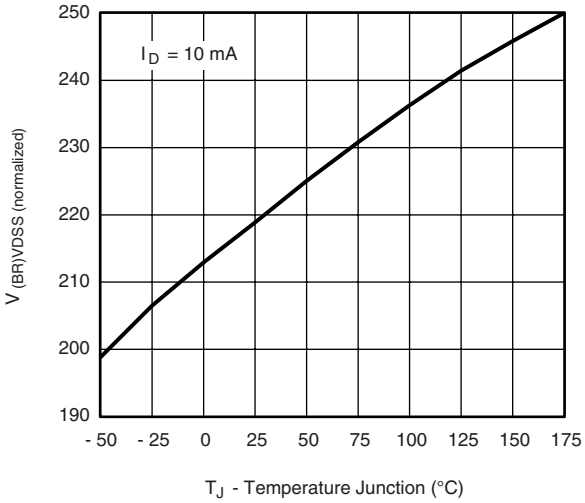
On-Resistance vs. Junction Temperature



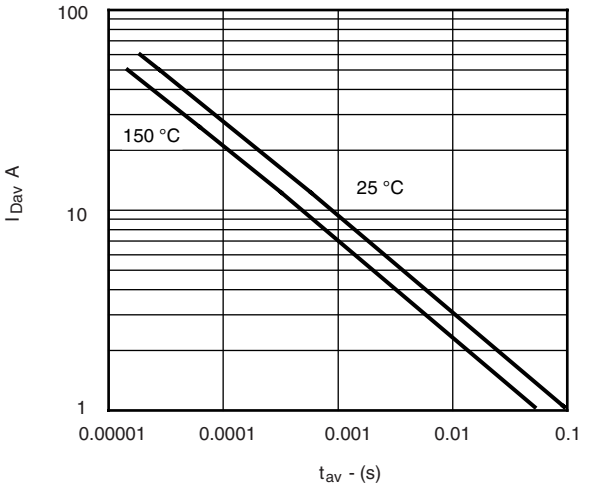
Source-Drain Diode Forward Voltage



Threshold Voltage

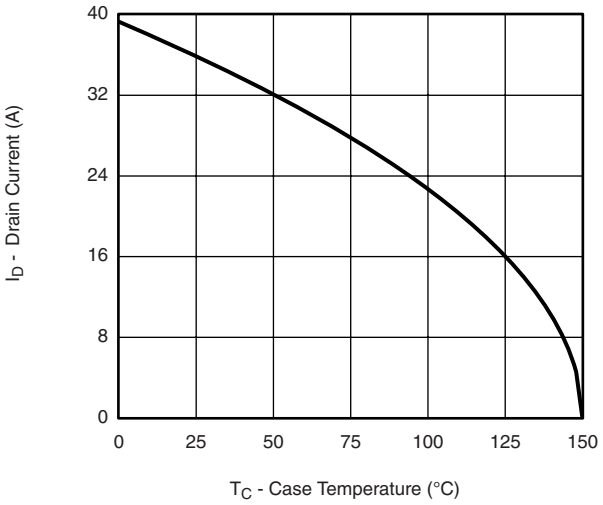


Drain Source Breakdown vs. Junction Temperature

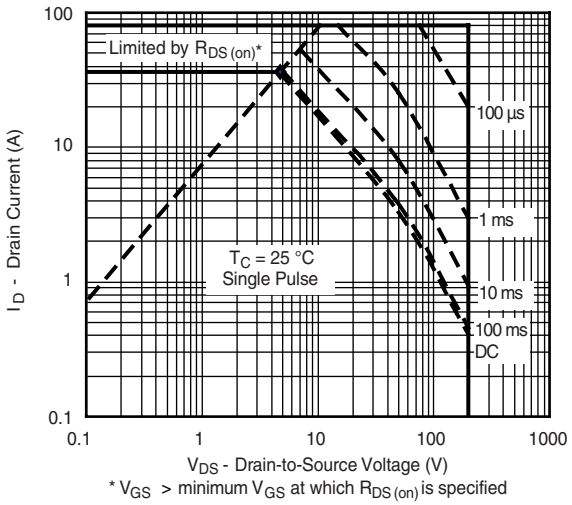


Single Pulse Avalanche Current Capability vs. Time

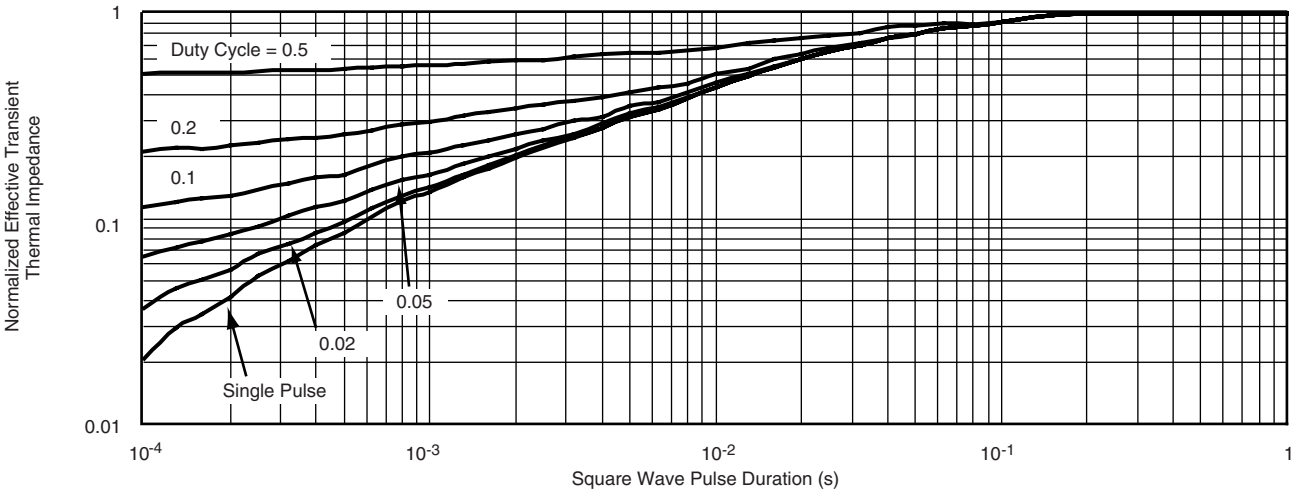
THERMAL RATINGS



Maximum Drain Curent vs. Case Temperature

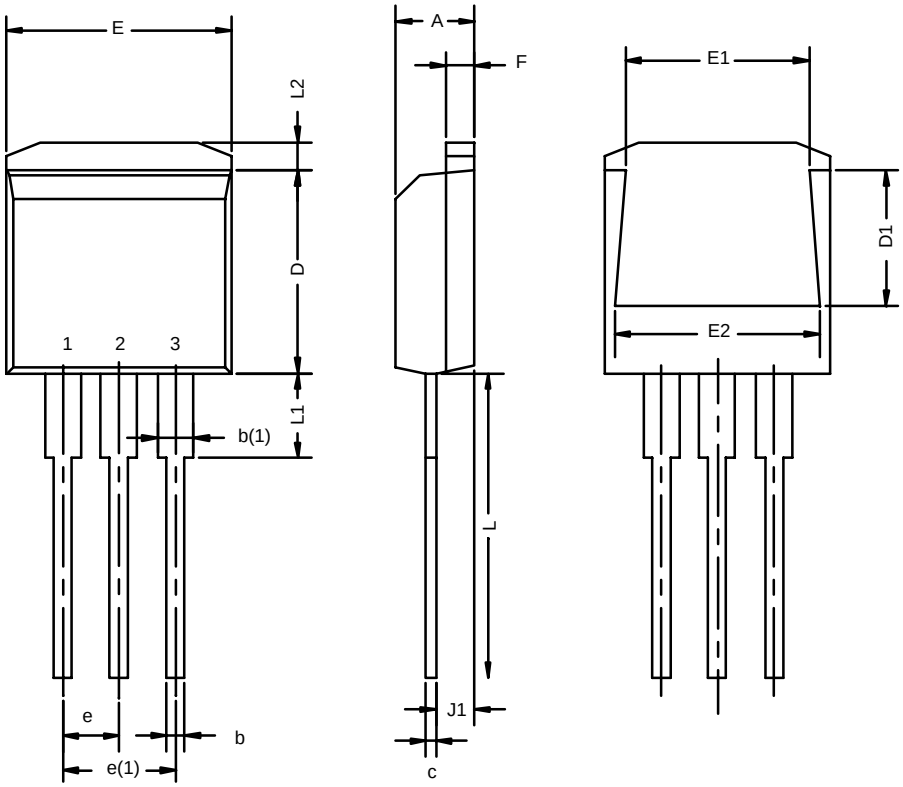


Safe Operating Area



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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