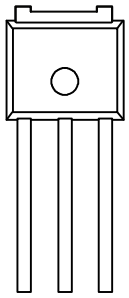
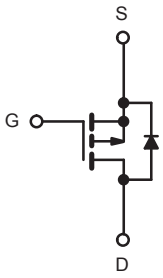
P-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
- 30	0.010 at V_{GS} = - 10 V	- 50[d]	43.1 nC
	0.015 at V_{GS} = - 4.5 V	- 50[d]	

TO-251



Top View



P-Channel MOSFET

FEATURES

- DT-Trench Power MOSFET
- Low On-Resistance for Low Voltage Drop
- Extended V_{GS} max. Rating: 25 V
- 100 % R_g and UIS Tested

RoHS COMPLIANT

APPLICATIONS

- Battery, Load and Adaptor Switches
  - Notebook Computers
  - Notebook Battery Packs

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 30	V
Gate-Source Voltage		V_{GS}	± 25	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 50[d]	A
	T_C = 70 °C		- 50[d]	
	T_A = 25 °C		- 23.1[a, b]	
	T_A = 70 °C		- 18.4[a, b]	
Pulsed Drain Current (t = 100 µs)		I_{DM}	- 300	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 50[d]	
	T_A = 25 °C		- 4.1[a, b]	
Avalanche Current	L = 0.1 mH	I_{AS}	- 25	
Single-Pulse Avalanche Energy		E_{AS}	31.2	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	48	W
	T_C = 70 °C		31	
	T_A = 25 °C		5[a, b]	
	T_A = 70 °C		3.2[a, b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)			260	

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a, c]	t ≤ 10 s	R_{thJA}	21	25	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	2.1	2.6	

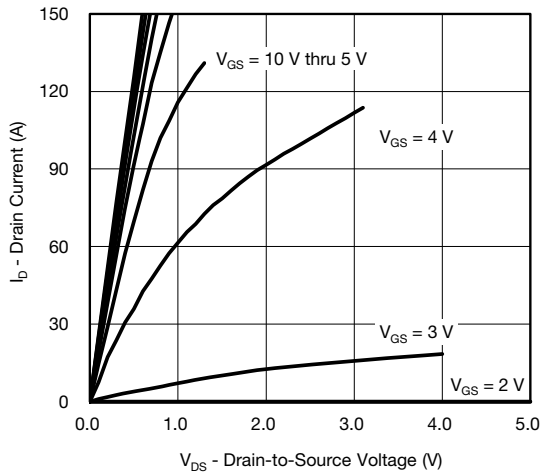
Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 10 s.
c. Maximum under steady state conditions is 70 °C/W.
d. Package limited.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0, I_D = - 250 µA	- 30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 22		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			4.1		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1.2		- 2.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 25 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 30 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 30 V, V_{GS} = 0 V, T_J = 55 °C			- 5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ - 10 V, V_{GS} = - 10 V	- 30			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 15 A		0.010	0.011	Ω
		V_{GS} = - 4.5 V, I_D = - 10 A		0.015	0.017	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 15 A		60		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 15 V, V_{GS} = 0 V, f = 1 MHz		5125		pF
Output Capacitance	C_{oss}			615		
Reverse Transfer Capacitance	C_{rss}			554		
Total Gate Charge	Q_g	V_{DS} = - 15 V, V_{GS} = - 10 V, I_D = - 10 A		90	135	nC
		V_{DS} = - 15 V, V_{GS} = - 4.5 V, I_D = - 10 A		43.1	65	
Gate-Source Charge	Q_{gs}			13.6		
Gate-Drain Charge	Q_{gd}			28.8		
Gate Resistance	R_g	f = 1 MHz	0.5	2.4	4.8	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 1.5 Ω $I_D \cong$ - 10 A, V_{GEN} = - 10 V, R_g = 1 Ω		15	30	ns
Rise Time	t_r			12	24	
Turn-Off DelayTime	$t_{d(off)}$			58	110	
Fall Time	t_f			12	24	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 1.5 Ω $I_D \cong$ - 10 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		60	120	
Rise Time	t_r			60	120	
Turn-Off DelayTime	$t_{d(off)}$			52	100	
Fall Time	t_f			26	52	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	T_C = 25 °C			- 50	A
Pulse Diode Forward Current (100 µs)	I_{SM}				- 300	
Body Diode Voltage	V_{SD}	I_S = - 3 A, V_{GS} = 0		- 0.74	- 1.20	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 10 A, dI/dt = 100 A/µs, T_J = 25 °C		23	46	ns
Body Diode Reverse Recovery Charge	Q_{rr}			12	24	nC
Reverse Recovery Fall Time	t_a			9		ns
Reverse Recovery Rise Time	t_b			14		

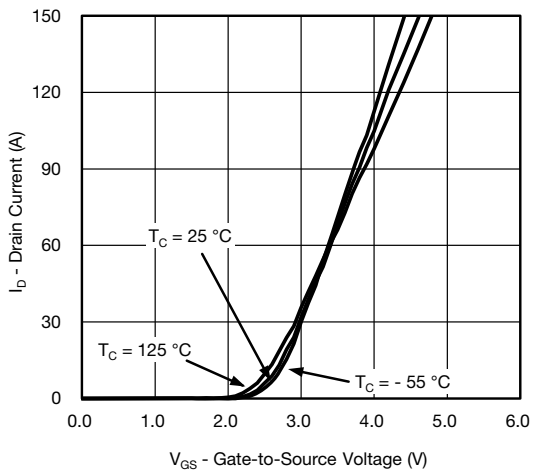
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

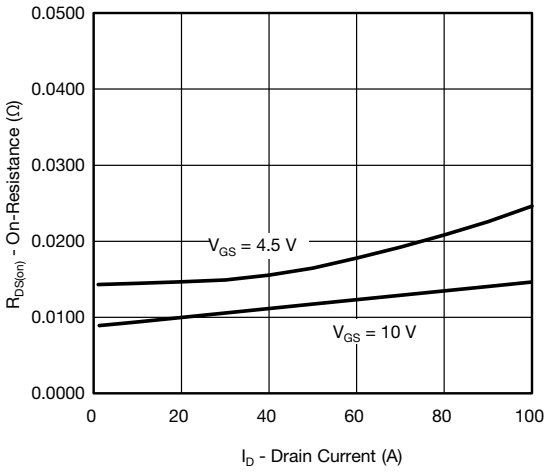
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



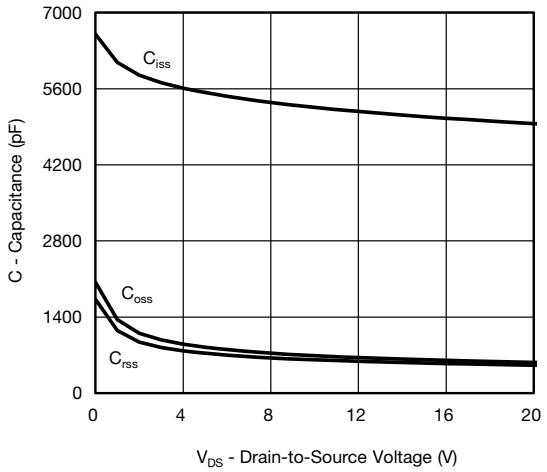
Output Characteristics



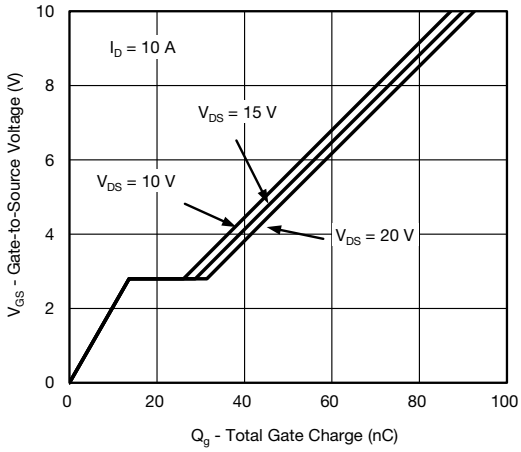
Transfer Characteristics



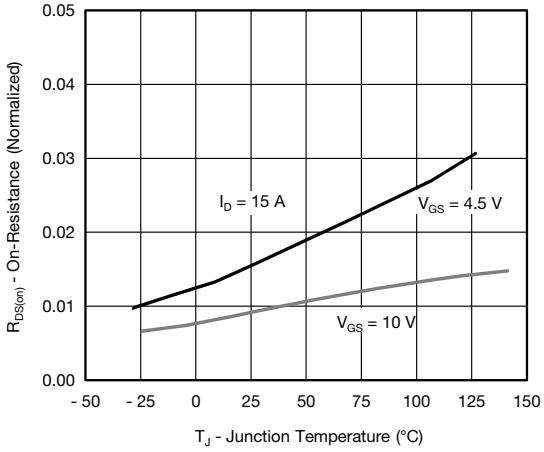
On-Resistance vs. Drain Current



Capacitance

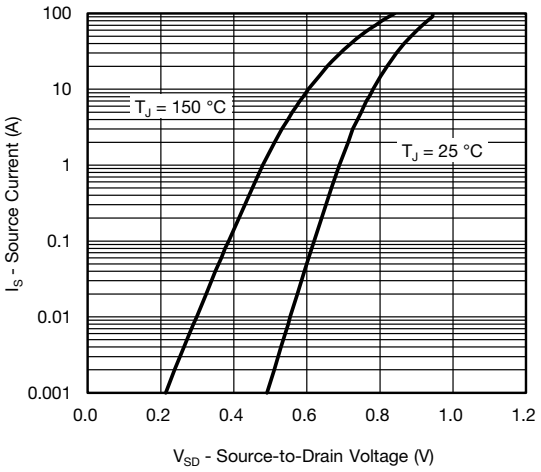


Gate Charge

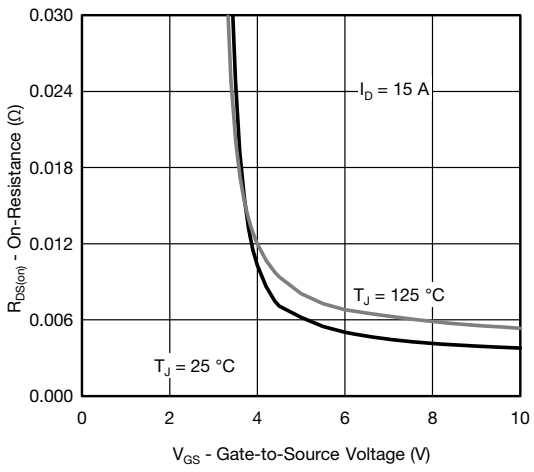


On-Resistance vs. Junction Temperature

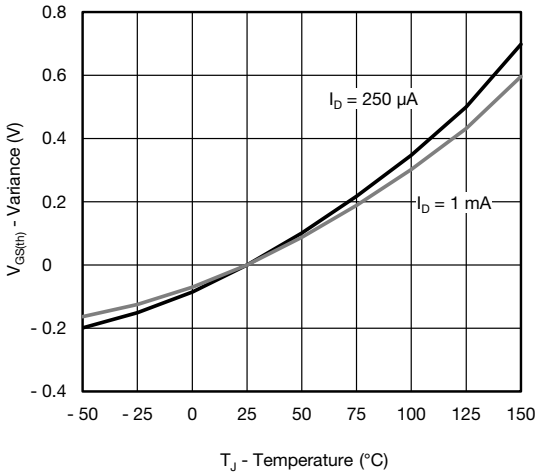
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



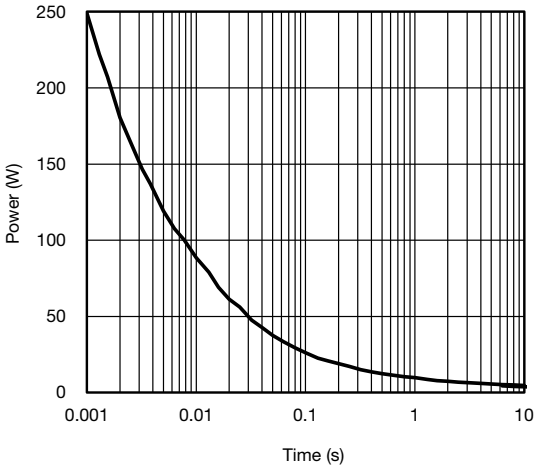
Source-Drain Diode Forward Voltage



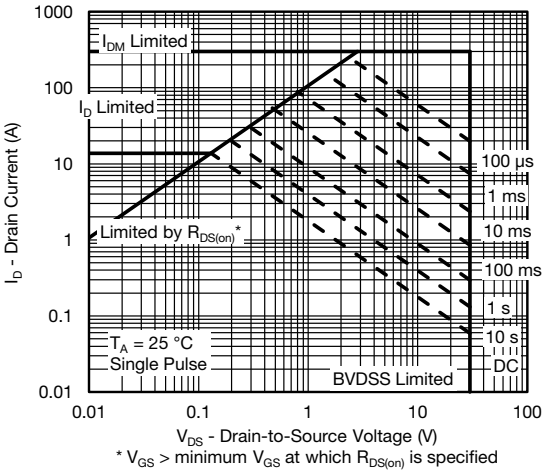
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

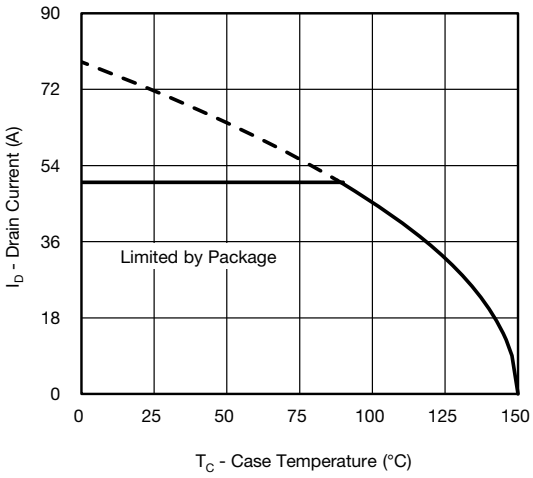


Single Pulse Power, Junction-to-Ambient

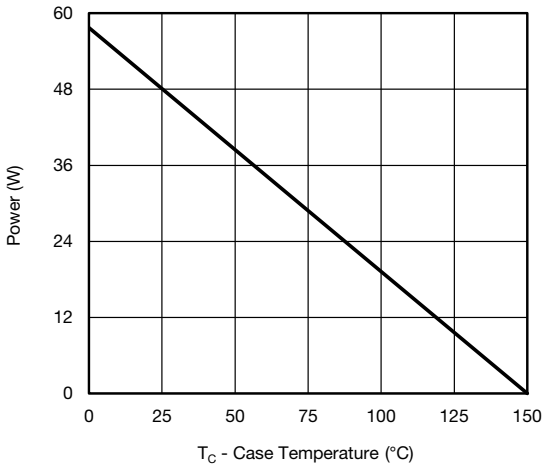


Safe Operating Area

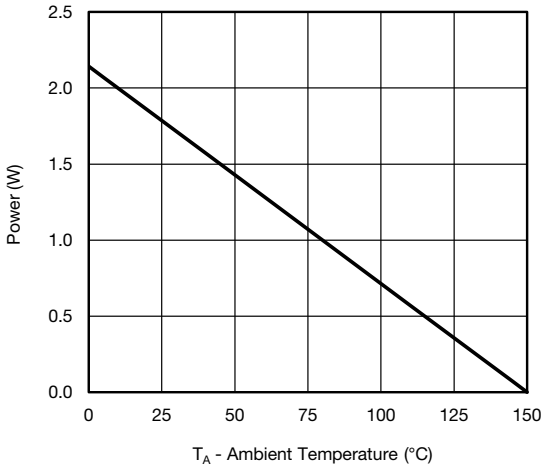
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



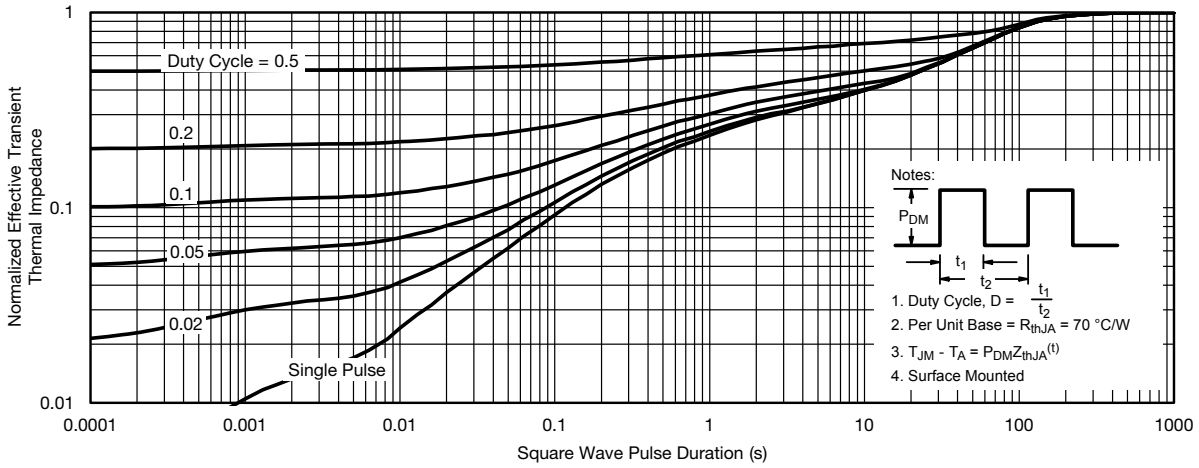
Power, Junction-to-Case



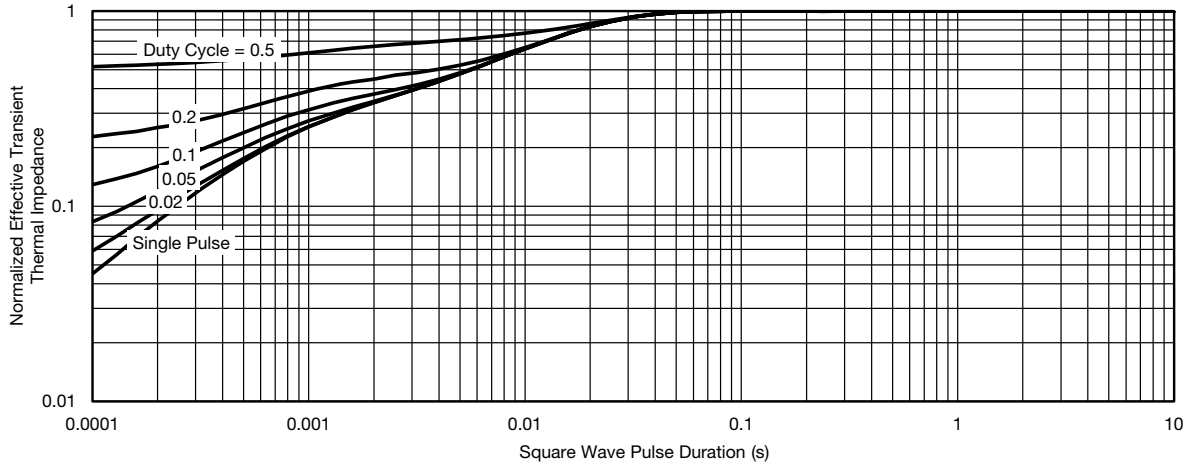
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max.)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

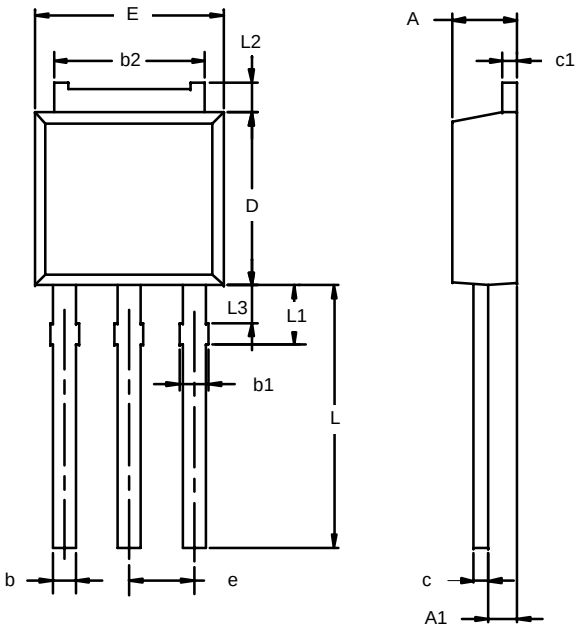


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

TO-251AA (DPAK)



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	8.89	9.53	0.350	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060
ECN: S-03946—Rev. E, 09-Jul-01 DWG: 5346				

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