

# N-Channel 250 V (D-S) Super Junction MOSFET

## PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )(Typ.)	$I_D$ (A) <sup>a</sup>	$Q_g$ (Typ.)
250	235 at $V_{GS} = 10$ V	8	25 nC
	240 at $V_{GS} = 4.5$ V		

## FEATURES

- DT-SJ Power MOSFET
- 100 %  $R_g$  and UIS Tested
- Low On Resistance
- Low Gate Charge

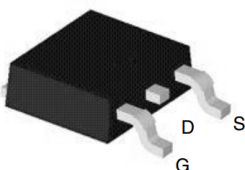
## APPLICATIONS

- DC/DC Converters
- DC/AC Inverters
- Motor Drives

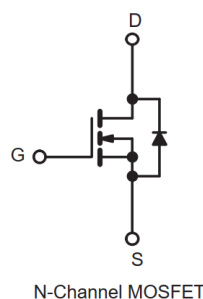


**RoHS**  
COMPLIANT

TO-252 Pin Configuration



Top View



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	250	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150$ °C)	$I_D$	$T_C = 25$ °C	A
		$T_C = 100$ °C	
Pulsed Drain Current	$I_{DM}$	32	
Single Pulse Avalanche Energy	$E_{AS}$	3	mJ
Maximum Power Dissipation	$P_D$	$T_C = 25$ °C	W
		$T_C = 100$ °C	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	°C

## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b</sup>	$R_{thJA}$	-	35	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	2	

Notes:

a. Based on  $T_C = 25$  °C.

b. Surface mounted on 1" x 1" FR4 board.

SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA	250			V
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1		2.5	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 200 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 200 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			100	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥10 V, V <sub>GS</sub> = 10 V	8			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3 A		235	305	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 3 A		240	336	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 3 A		12		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 125 V, V <sub>GS</sub> = 0 V, f = 1 MHz		894		pF
Output Capacitance	C <sub>oss</sub>			36		
Reverse Transfer Capacitance	C <sub>rss</sub>			22		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 125 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3 A		25		nC
Gate-Source Charge	Q <sub>gs</sub>			2.6		
Gate-Drain Charge	Q <sub>gd</sub>			6.4		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		3.2		Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 125 V , I <sub>D</sub> ≅ 3 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 6 Ω		10		ns
Rise Time	t <sub>r</sub>			18		
Turn-Off DelayTime	t <sub>d(off)</sub>			49		
Fall Time	t <sub>f</sub>			96		
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			8	A
Pulse Diode Forward Current (100 μs)	I <sub>SM</sub>				32	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 1 A			1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 3 A, dI/dt = 100 A/μs, T <sub>J</sub> = 25 °C		68		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			158		nC

Notes:

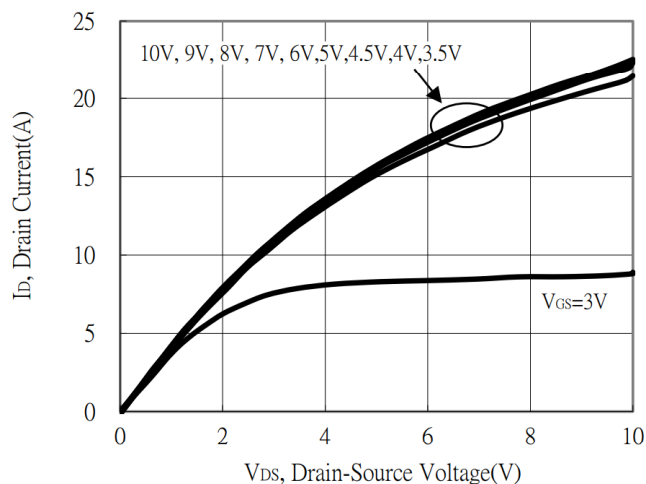
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

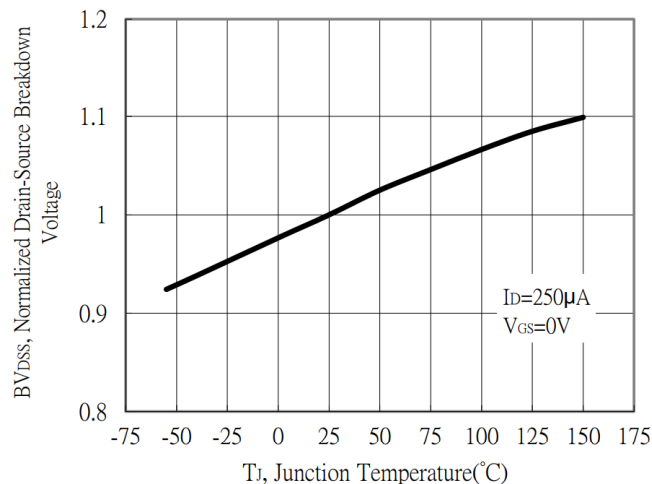
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

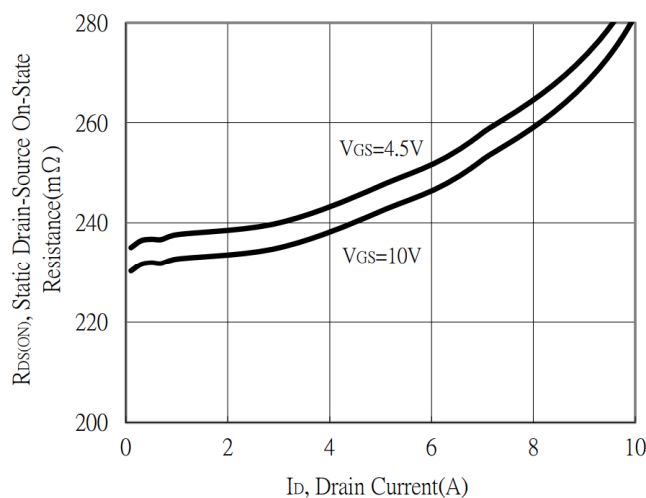
Typical Output Characteristics



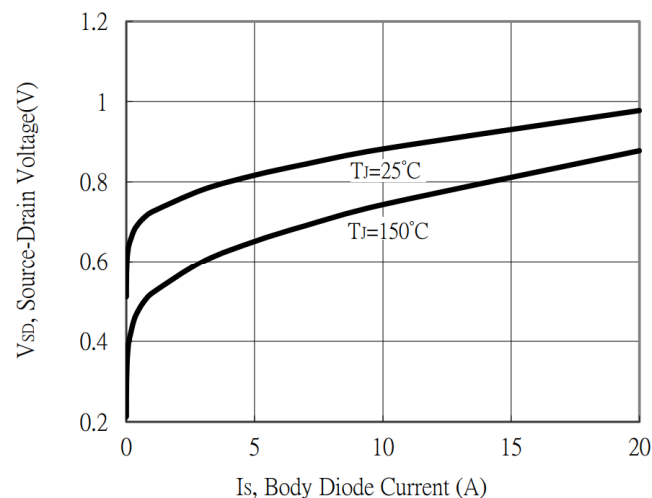
Breakdown Voltage vs Ambient Temperature



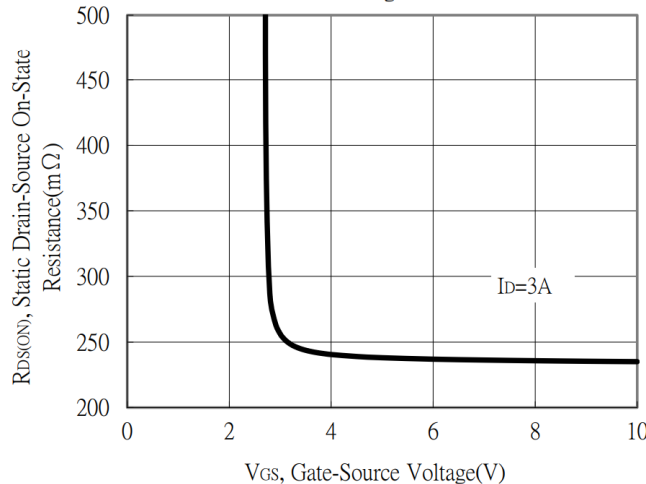
Static Drain-Source On-State resistance vs Drain Current



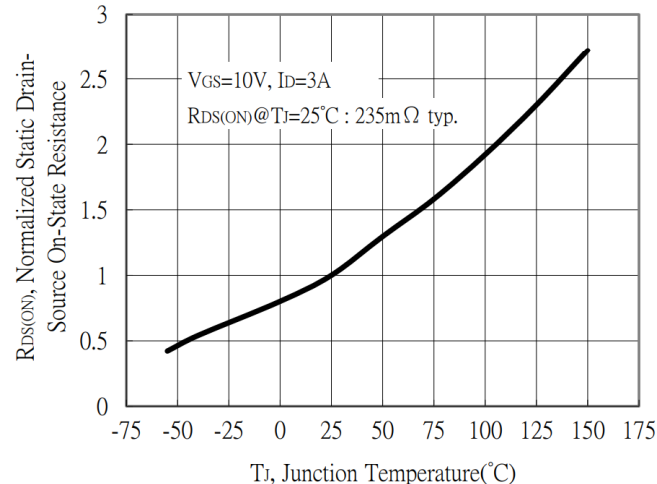
Body Diode Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

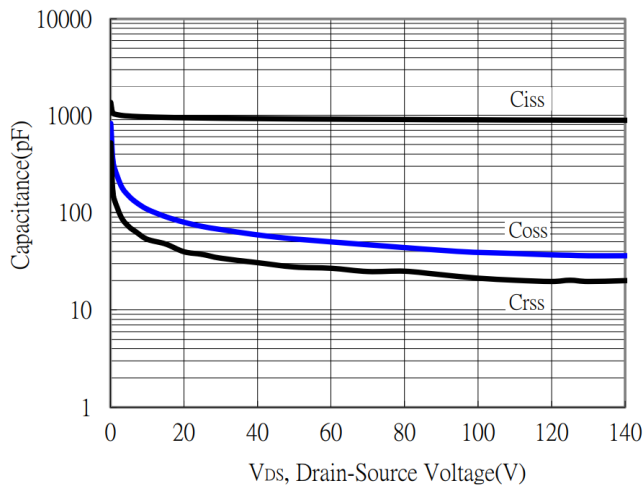


Drain-Source On-State Resistance vs Junction Temperature

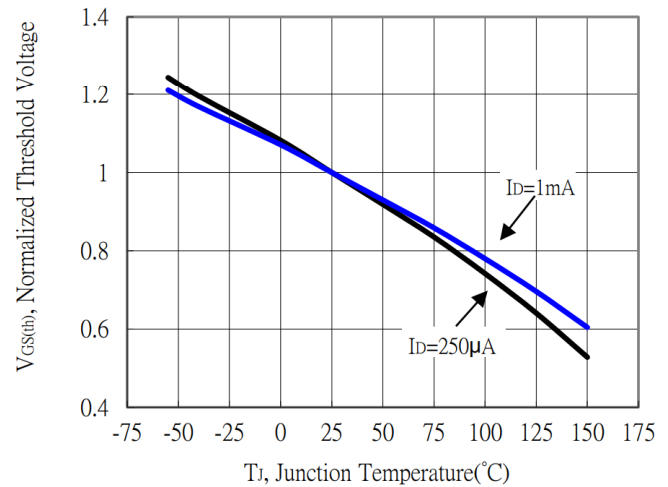


**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

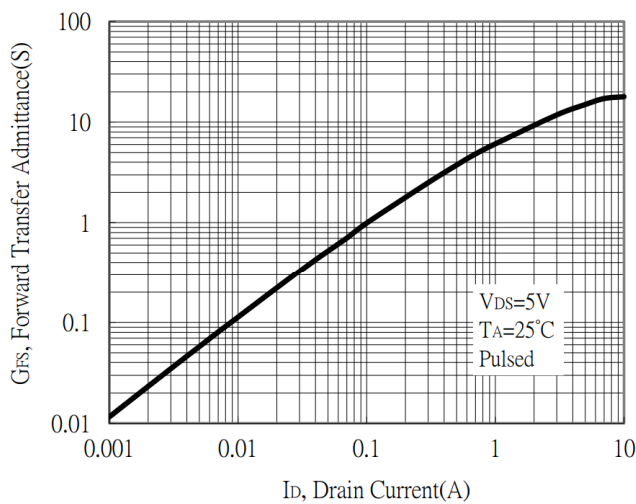
Capacitance vs Drain-to-Source Voltage



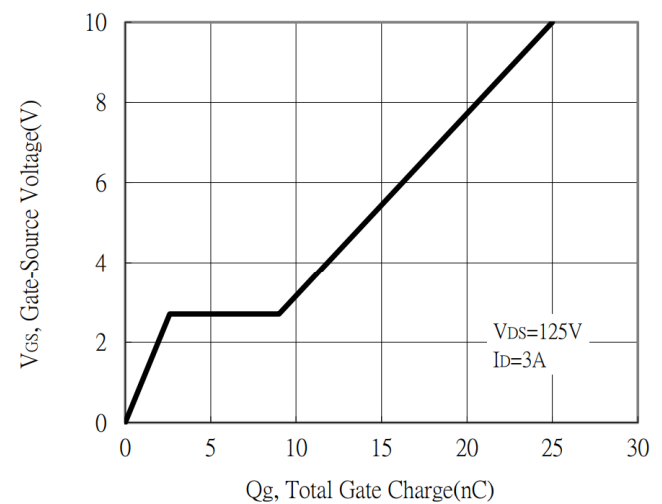
Threshold Voltage vs Junction Temperature



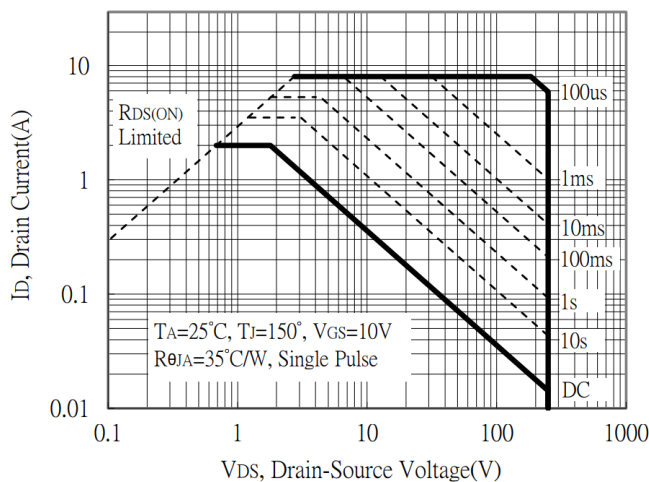
Forward Transfer Admittance vs Drain Current



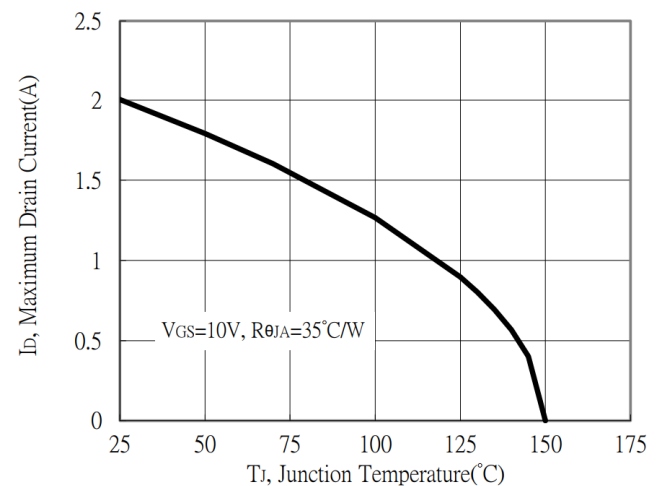
Gate Charge Characteristics



Maximum Safe Operating Area

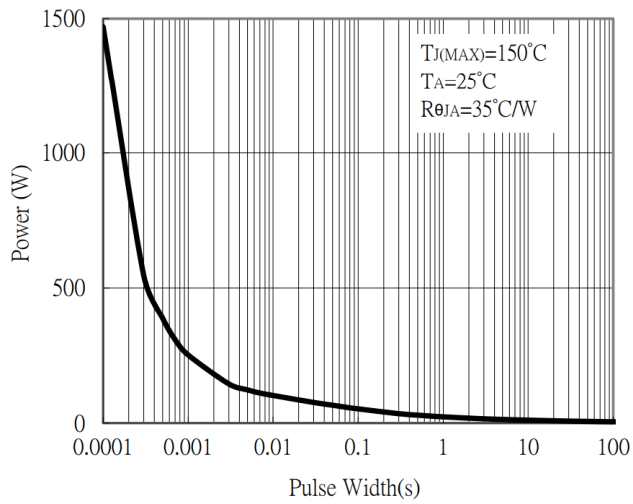


Maximum Drain Current vs Junction Temperature

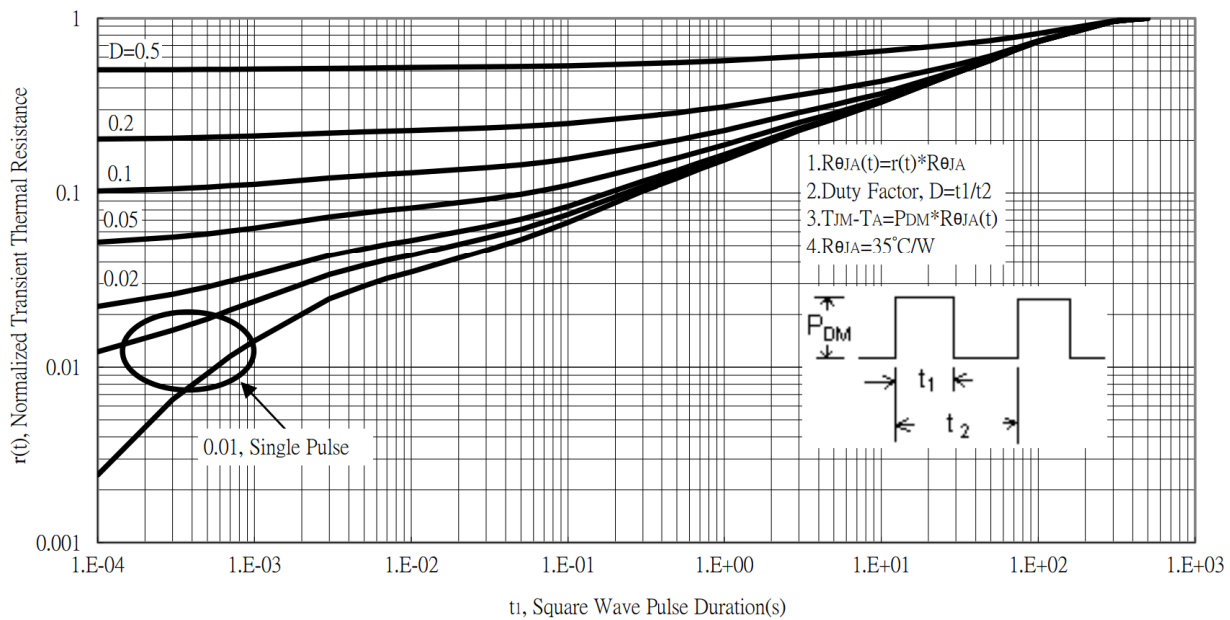


**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

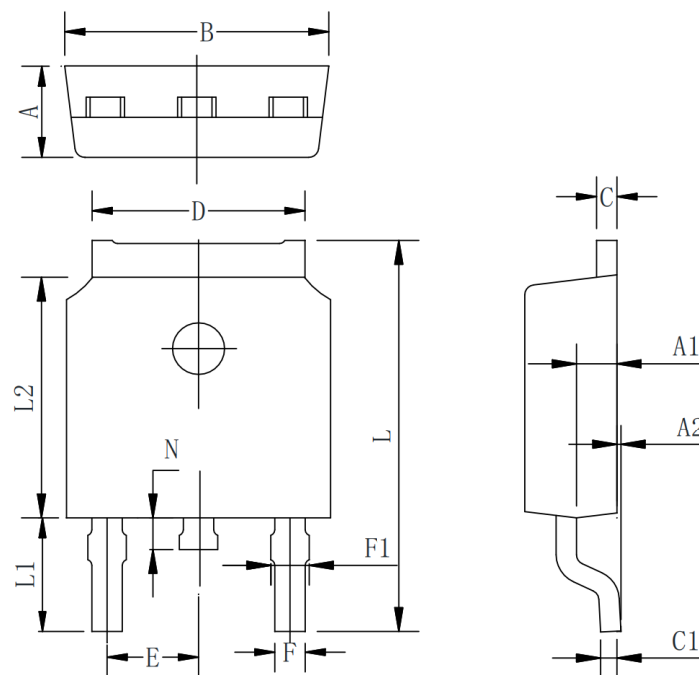
Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves



## TO-252-2L PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	2.10	2.30	2.50
A1	0.88	1.01	1.16
A2	0.00	0.15	0.28
B	6.40	6.60	6.80
C	0.42	0.50	0.63
C1	0.42	0.50	0.63
D	5.08	5.32	5.65
E	2.286 TYP		
F	0.63	0.76	0.89
F1	0.64	0.86	1.08
L	9.30	9.90	10.80
L1	2.4	2.8	3.6
L2	5.90	6.10	6.55
N	0.57	0.80	1.05

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