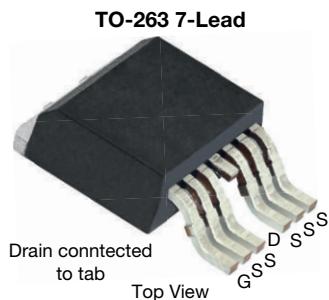


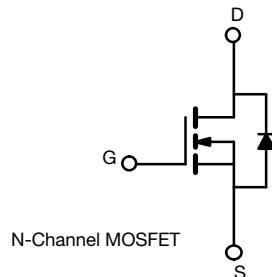
Automotive N-Channel 40 V (D-S) 175 °C MOSFET



PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00163
I_D (A)	150
Configuration	Single
Package	TO-263-7L

FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- 100 % R_g and UIS tested
- AEC-Q101 qualified
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	40	V
Gate-source voltage	V_{GS}	± 20	
Continuous drain current	I_D	150	A
		125	
Continuous source current (diode conduction) ^a	I_S	136	
Pulsed drain current ^b	I_{DM}	300	
Single pulse avalanche current	I_{AS}	60	mJ
Single pulse avalanche energy	E_{AS}	180	
Maximum power dissipation ^b	P_D	150	W
		50	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R_{thJA}	40	°C/W
Junction-to-case (drain)	R_{thJC}	1	

Notes

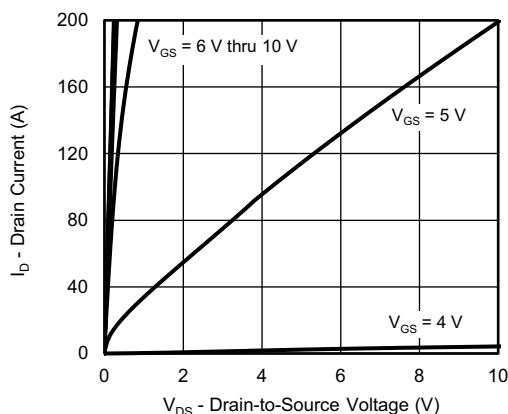
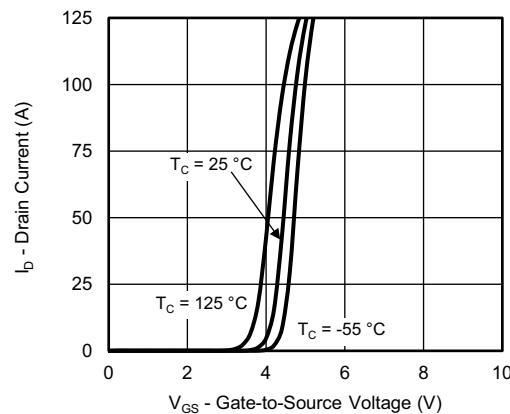
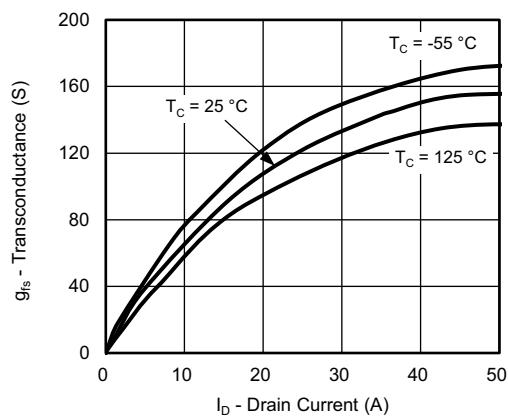
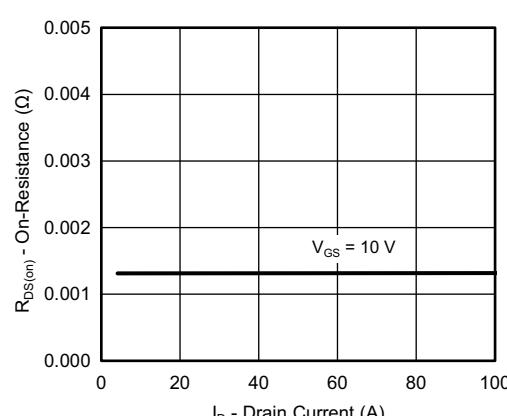
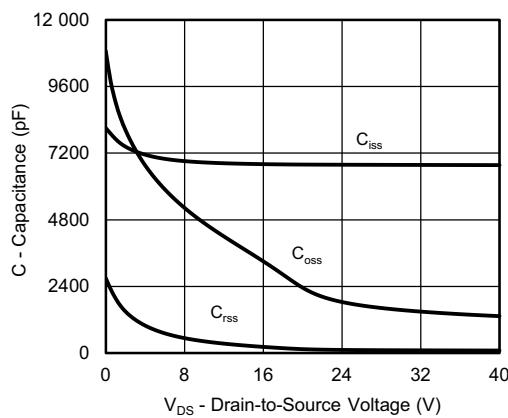
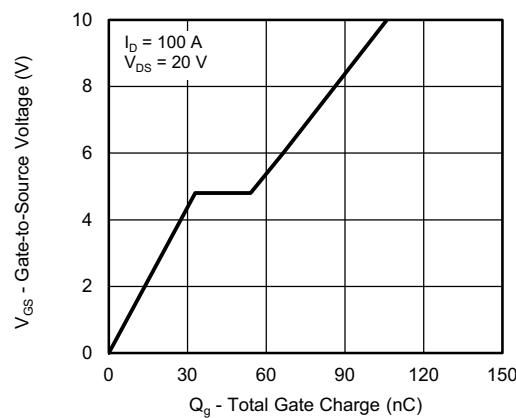
- a. Package limited
- b. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
- c. When mounted on 1" square PCB (FR4 material)

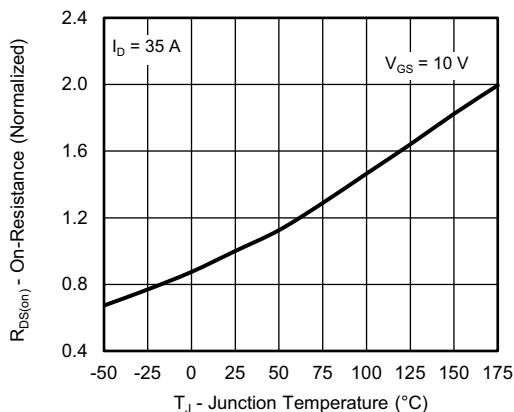
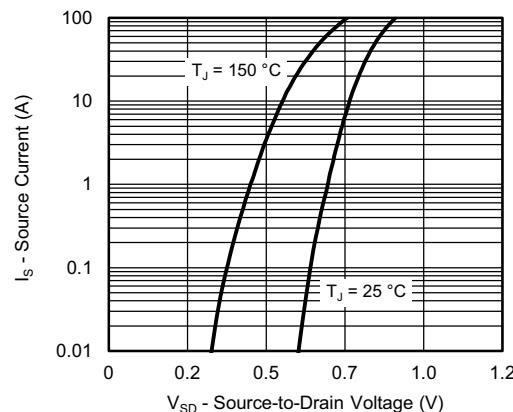
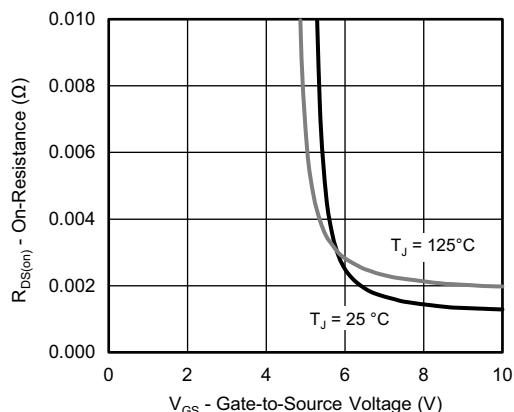
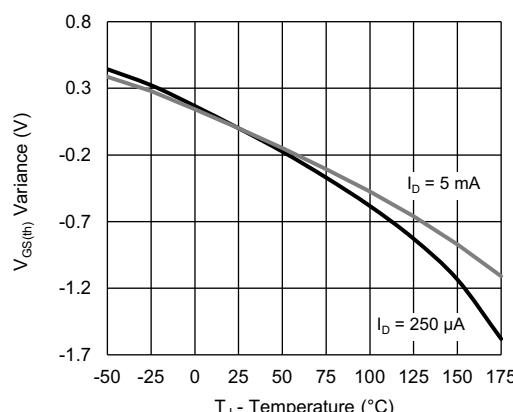
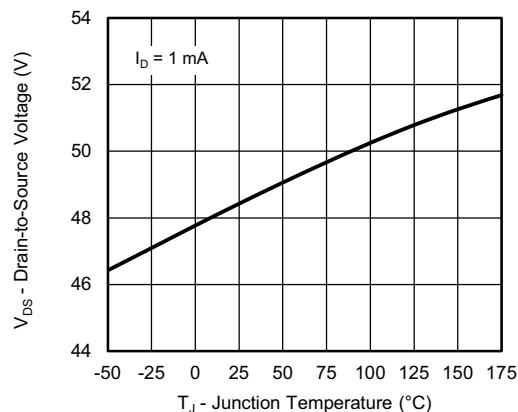
SPECIFICATIONS ($T_C = 25^\circ\text{C}$, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static								
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$		40	-	-	V	
Gate-source threshold voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$		2.5	3.0	3.5		
Gate-source leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$		-	-	± 100	nA	
Zero gate voltage drain current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$	-	-	1	μA	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$, $T_J = 125^\circ\text{C}$	-	-	50		
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$, $T_J = 175^\circ\text{C}$	-	-	300	μA	
On-state drain current ^a	$I_{D(\text{on})}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	100	-	-	A	
Drain-source on-state resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10\text{ V}$	$I_D = 35\text{ A}$	-	0.00133	0.00163	Ω	
		$V_{GS} = 10\text{ V}$	$I_D = 35\text{ A}$, $T_J = 125^\circ\text{C}$	-	-	0.00268		
		$V_{GS} = 10\text{ V}$	$I_D = 35\text{ A}$, $T_J = 175^\circ\text{C}$	-	-	0.00326		
Forward transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 35\text{ A}$		-	143	-	S	
Dynamic ^b								
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	-	6783	9200	pF	
Output capacitance	C_{oss}			-	1771	2400		
Reverse transfer capacitance	C_{rss}			-	109	150		
Total gate charge ^c	Q_g	$V_{GS} = 10\text{ V}$	$V_{DS} = 20\text{ V}$, $I_D = 100\text{ A}$	-	106	160	nC	
Gate-source charge ^c	Q_{gs}			-	33	-		
Gate-drain charge ^c	Q_{gd}			-	21	-		
Gate resistance	R_g	$f = 1\text{ MHz}$		1.25	2.75	4.35	Ω	
Turn-on delay time ^c	$t_{d(\text{on})}$	$V_{DD} = 20\text{ V}$, $R_L = 0.2\text{ }\Omega$ $I_D \geq 100\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$		-	19	30	ns	
Rise time ^c	t_r			-	194	300		
Turn-off delay time ^c	$t_{d(\text{off})}$			-	45	70		
Fall time ^c	t_f			-	26	40		
Source-Drain Diode Ratings and Characteristics ^b								
Pulsed current ^a	I_{SM}			-	-	300	A	
Forward voltage	V_{SD}	$I_F = 60\text{ A}$, $V_{GS} = 0\text{ V}$		-	0.83	1.5	V	
Body diode reverse recovery time	t_{rr}	$I_F = 30\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		-	88	180	ns	
Body diode reverse recovery charge	Q_{rr}			-	186	380	nC	
Reverse recovery fall time	t_a			-	57	-	ns	
Reverse recovery rise time	t_b			-	31	-		
Body diode peak reverse recovery current	$I_{RM(\text{REC})}$			-	-4.6	-	A	

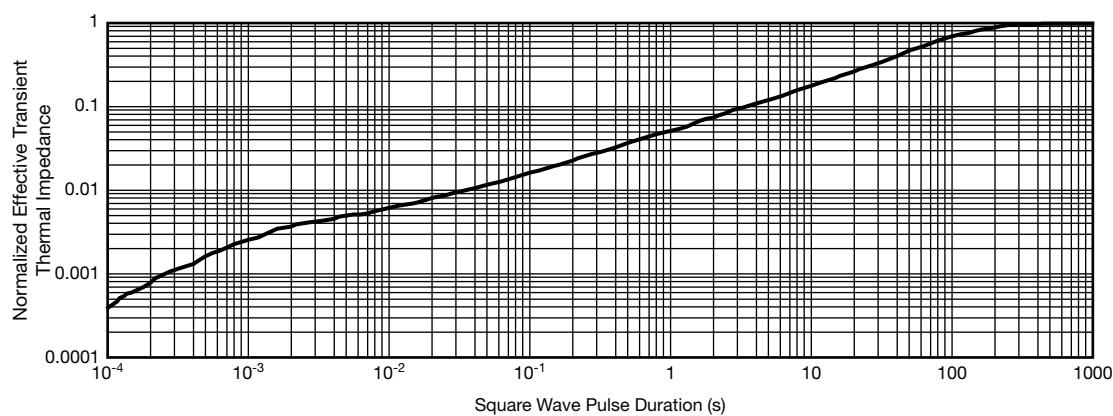
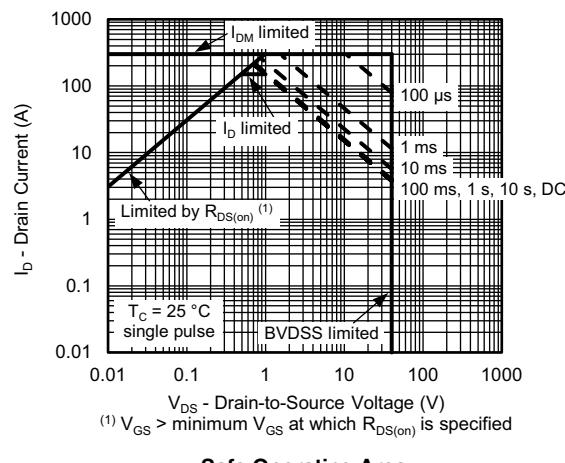
Notes

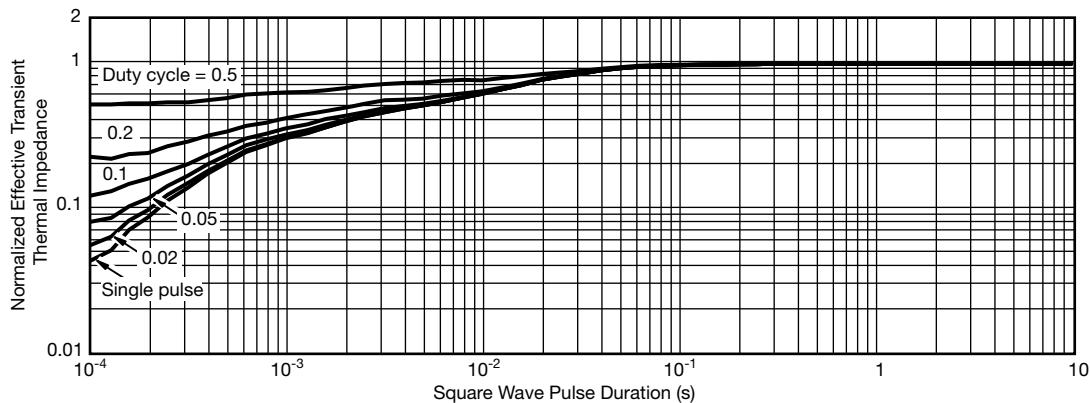
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- Guaranteed by design, not subject to production testing
- Independent of operating temperature

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 ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Normalized Thermal Transient Impedance, Junction-to-Ambient

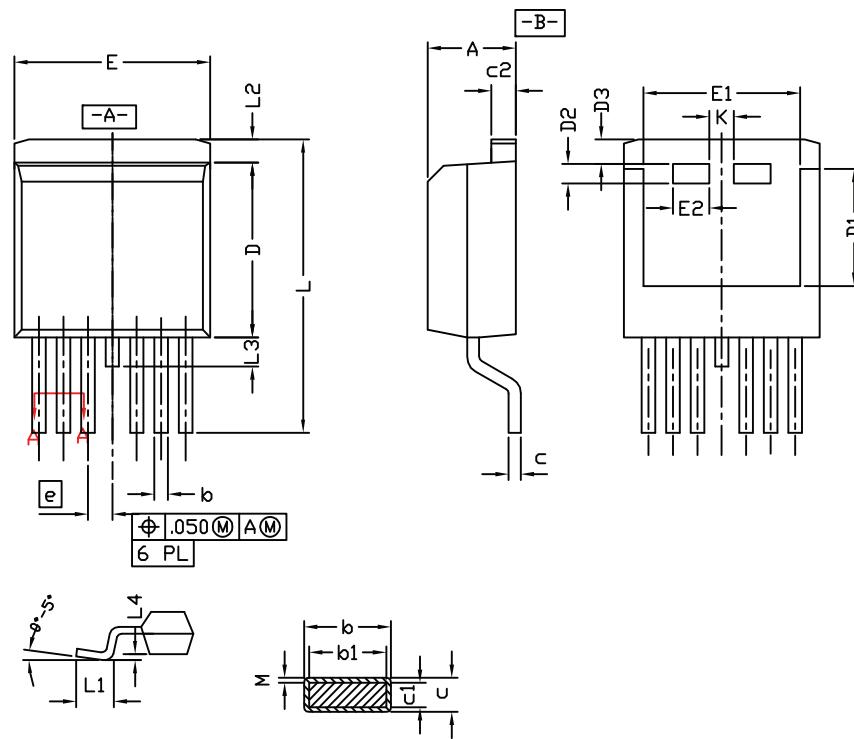
THERMAL RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Normalized Thermal Transient Impedance, Junction-to-Case
Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25°C)
 - Normalized Transient Thermal Impedance Junction-to-Case (25°C)

are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions

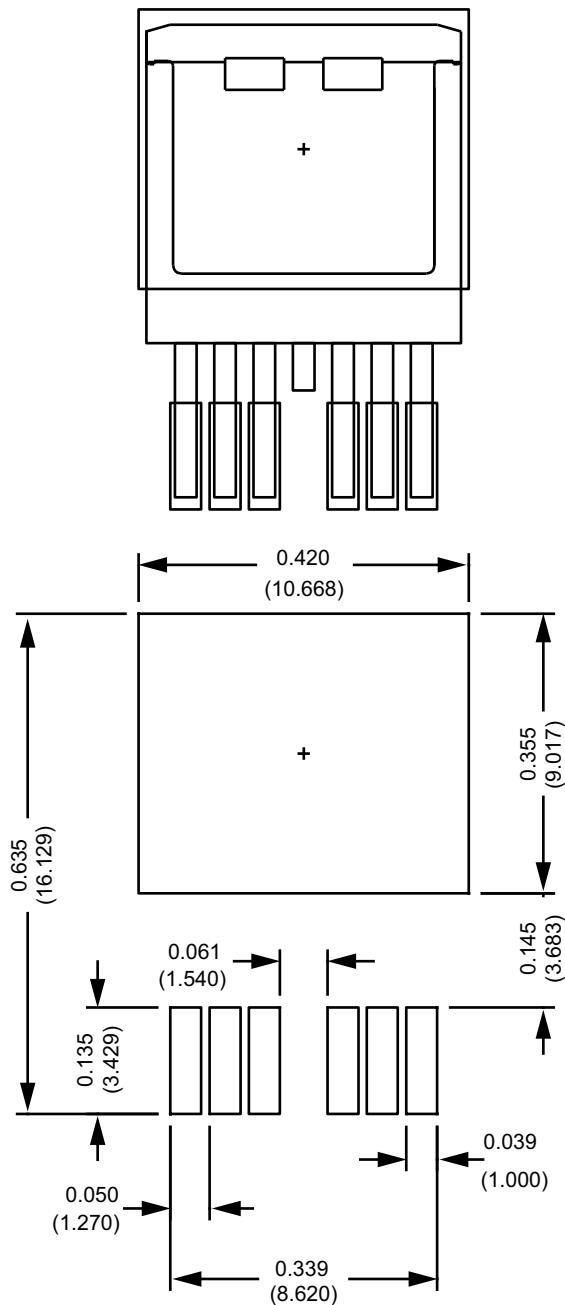
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D²PAK (TO-263-7L) Case Outline


Notes

1. Plane B includes maximum features of heat sink tab and plastic.
2. No more than 25 % of L1 can fall above seating plane by max. 8 mils.
3. Pin to pin coplanarity max. 4 mils.
4. Lead thickness 25 mils.
5. For SUM part numbers lead thickness is 24 mils to 29 mils.
6. For reference only.
7. Use inches as the primary measurement.
8. This feature is only for SUM.

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.160	0.190	4.064	4.826
b	0.020	0.039	0.508	0.990
b1	0.020	0.035	0.508	0.889
b2	0.045	0.055	1.143	1.397
c* SUB	0.012	0.018	0.305	0.457
c* SUM	0.022	0.028	0.559	0.711
c1	0.018	0.025	0.457	0.635
c2	0.045	0.055	1.143	1.397
D	0.340	0.380	8.636	9.652
D1	0.220	0.240	5.588	6.096
D2	0.038	0.042	0.965	1.067
D3	0.045	0.055	1.143	1.397
E	0.380	0.410	9.652	10.414
E1	0.245	-	6.223	-
E2	0.072	0.078	1.829	1.981
e	0.050 BSC		1.27 BSC	
K	0.045	0.055	1.143	1.397
L	0.575	0.625	14.605	15.875
L1	0.090	0.110	2.286	2.794
L2	0.040	0.055	1.016	1.397
L3	0.050	0.070	1.270	1.778
L4	0.010 BSC		0.254 BSC	
M	-	0.002	-	0.050
ECN: T13-0709-Rev. B, 30-Sep-13				
DWG: 6006				

Recommended Land Pattern D²PAK (TO-263-7L)

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