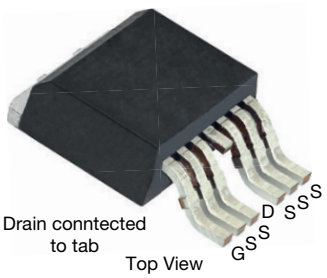
N-Channel 40 V (D-S) MOSFET

TO-263 7-Lead



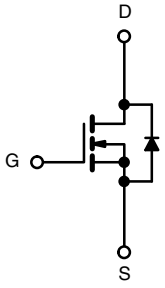
FEATURES

- TrenchFET® Gen IV power MOSFET
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Power supply
  - Secondary synchronous rectification
- DC/DC converter
- Power tools
- Motor drive switch
- DC/AC inverter
- Battery management
- OR-ing



N-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.00099
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.00136
Q_g typ. (nC)	182
I_D (A) [d]	200
Configuration	Single

ORDERING INFORMATION	
Package	D^2PAK (TO-263-7L)
Lead (Pb)-free and halogen-free	SUM40014M-GE3

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 (T_J = 150 °C)	T_C = 25 °C	I_D	200 [d]	A
	T_C = 70 °C		200 [d]	
Pulsed drain current (t = 100 µs)		I_{DM}	400	
Avalanche current		I_{AS}	70	
Single avalanche energy [a]	L = 0.1 mH	E_{AS}	245	mJ
Maximum power dissipation [a]	T_C = 25 °C	P_D	375 [b]	W
	T_C = 125 °C		125 [b]	
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}	0.4	

Notes

a. Duty cycle ≤ 1 %
b. See SOA curve for voltage derating
c. When mounted on 1" square PCB (FR4 material)
d. Package limited

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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 V, I_D = 10 mA	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.1	-	2.4	
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 250	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 40 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 40 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 40 V, V_{GS} = 0 V, T_J = 175 °C	-	-	5	mA
On-state drain current [a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 10 V	100	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A	-	0.00082	0.00099	Ω
		V_{GS} = 4.5 V, I_D = 15 A	-	0.00113	0.00136	
Forward transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 20 A	-	140	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 20 V, f = 1 MHz	-	15 780	-	pF
Output capacitance	C_{oss}		-	2280	-	
Reverse transfer capacitance	C_{rss}		-	90	-	
Total gate charge [c]	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 20 A	-	182	275	nC
Gate-source charge [c]	Q_{gs}		-	41	-	
Gate-drain charge [c]	Q_{gd}		-	9	-	
Gate resistance	R_g	f = 1 MHz	0.5	2.4	4.8	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 50 V, R_L = 5 Ω I_D ≅ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	20	40	ns
Rise time [c]	t_r		-	10	20	
Turn-off delay time [c]	$t_{d(off)}$		-	100	200	
Fall time [c]	t_f		-	35	70	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed current (t = 100 µs)	I_{SM}		-	-	600	A
Forward voltage [a]	V_{SD}	I_F = 10 A, V_{GS} = 0 V	-	0.72	1.5	V
Reverse recovery time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs	-	55	80	ns
Peak reverse recovery charge	$I_{RM(REC)}$		-	2.2	5	A
Reverse recovery charge	Q_{rr}		-	0.065	0.13	µC

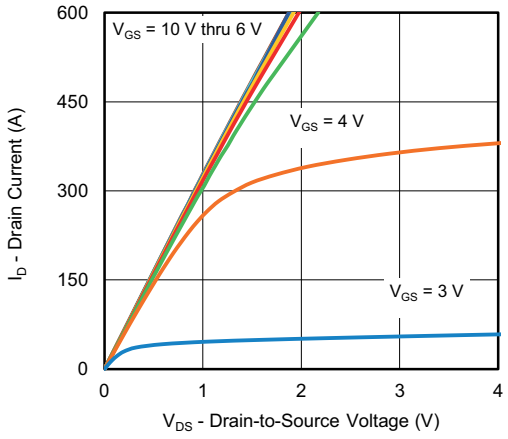
Notes

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

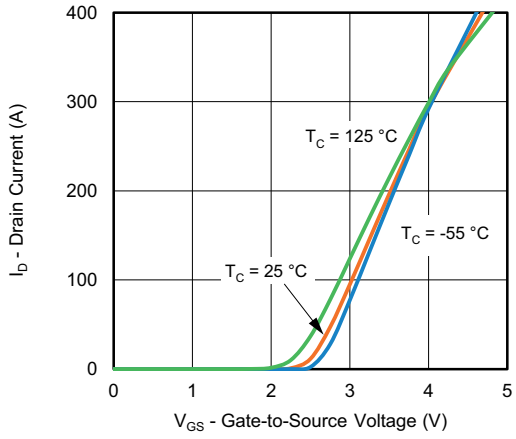
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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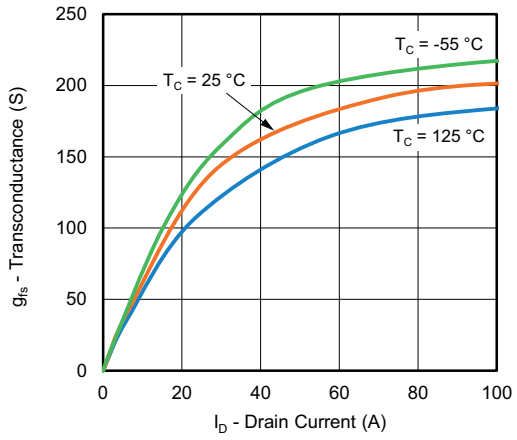
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



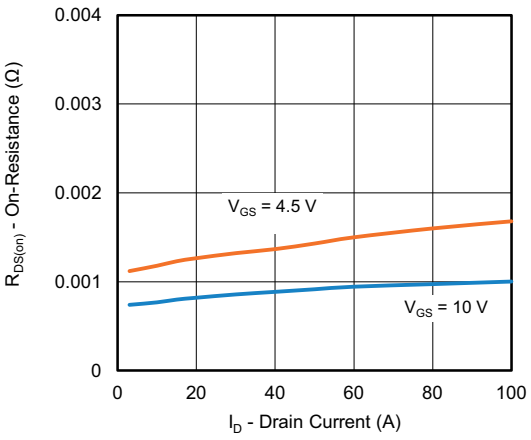
Output Characteristics



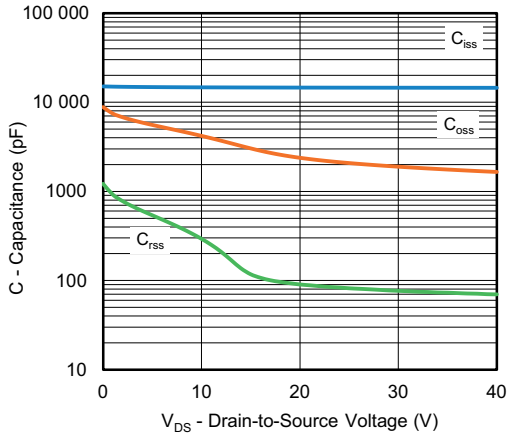
Transfer Characteristics



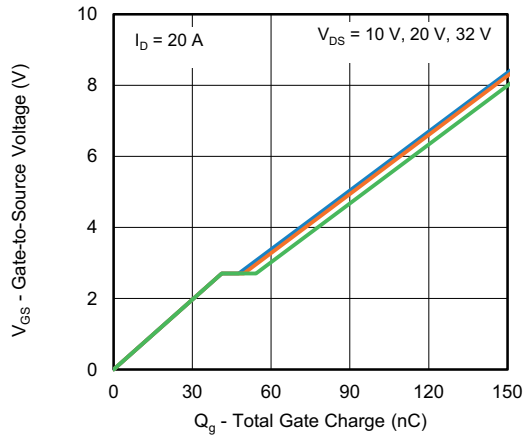
Transconductance



On-Resistance vs. Drain Current



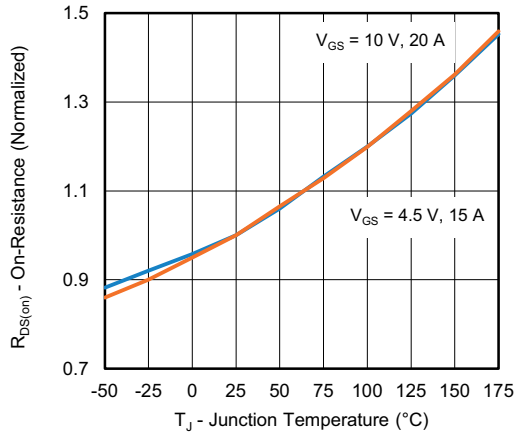
Capacitance



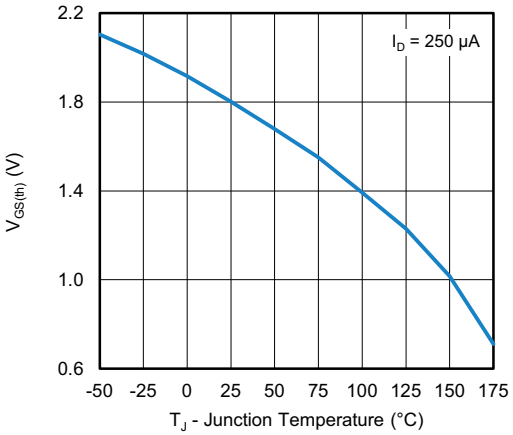
Gate Charge

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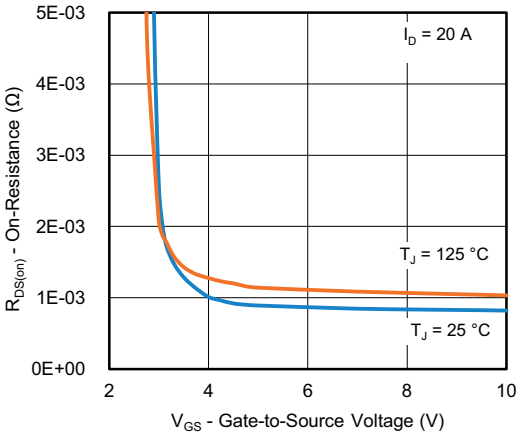
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



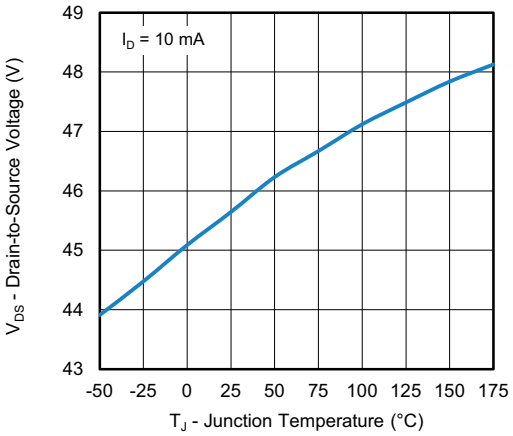
On-Resistance vs. Junction Temperature



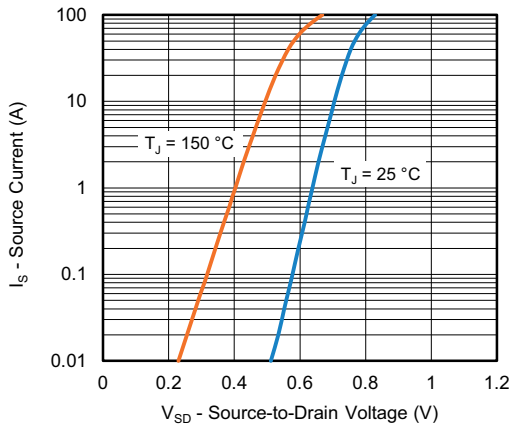
Threshold Voltage



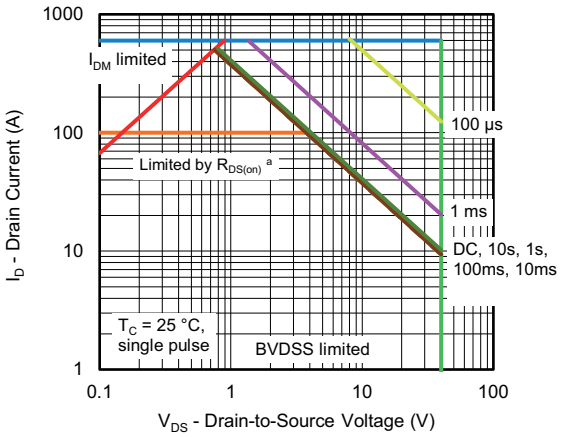
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature



Source Drain Diode Forward Voltage



Safe Operating Area

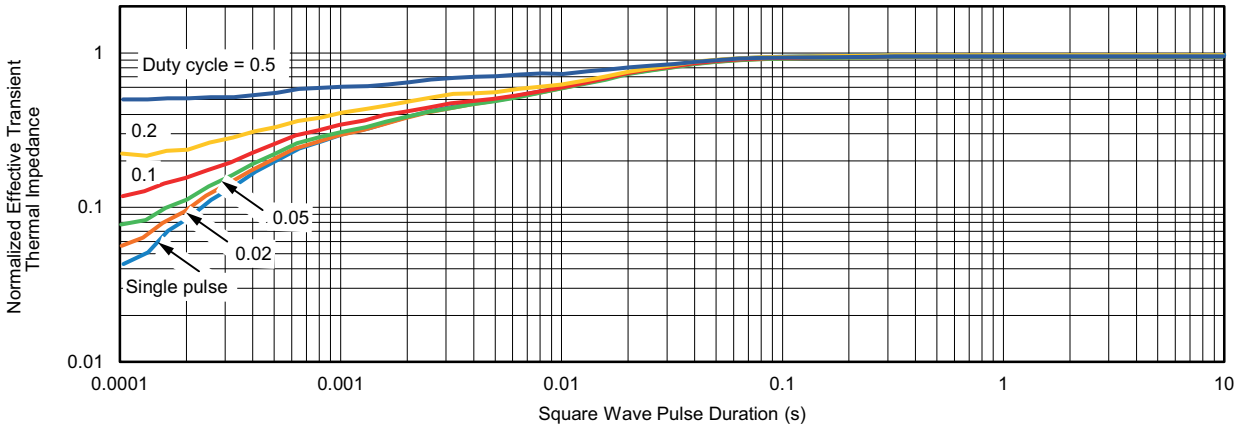
Note

a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

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THERMAL RATINGS (T_A = 25 °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)

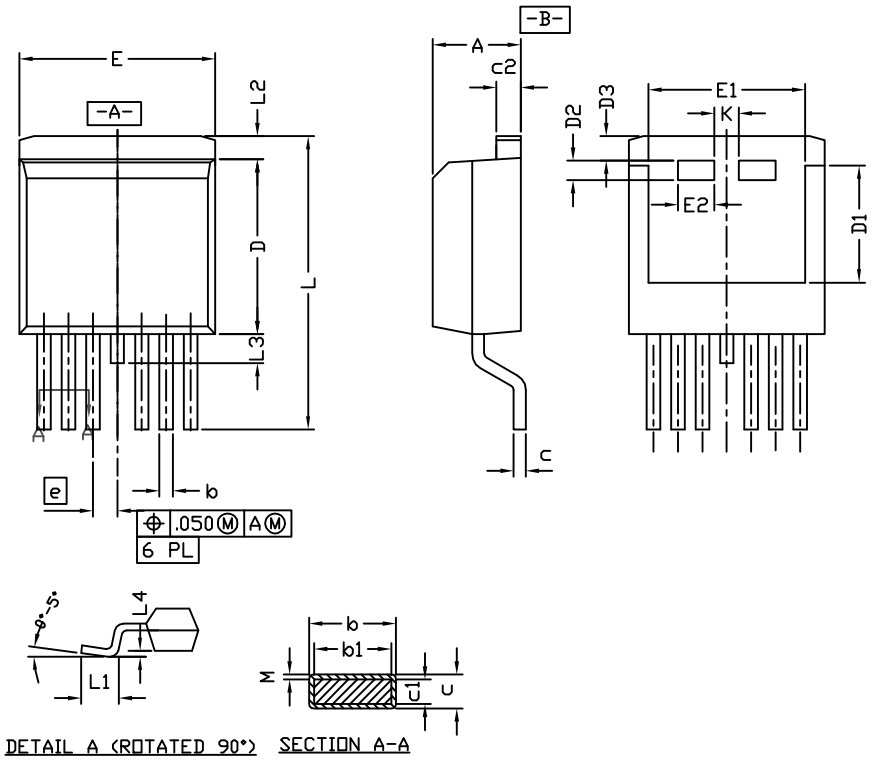
  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit 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



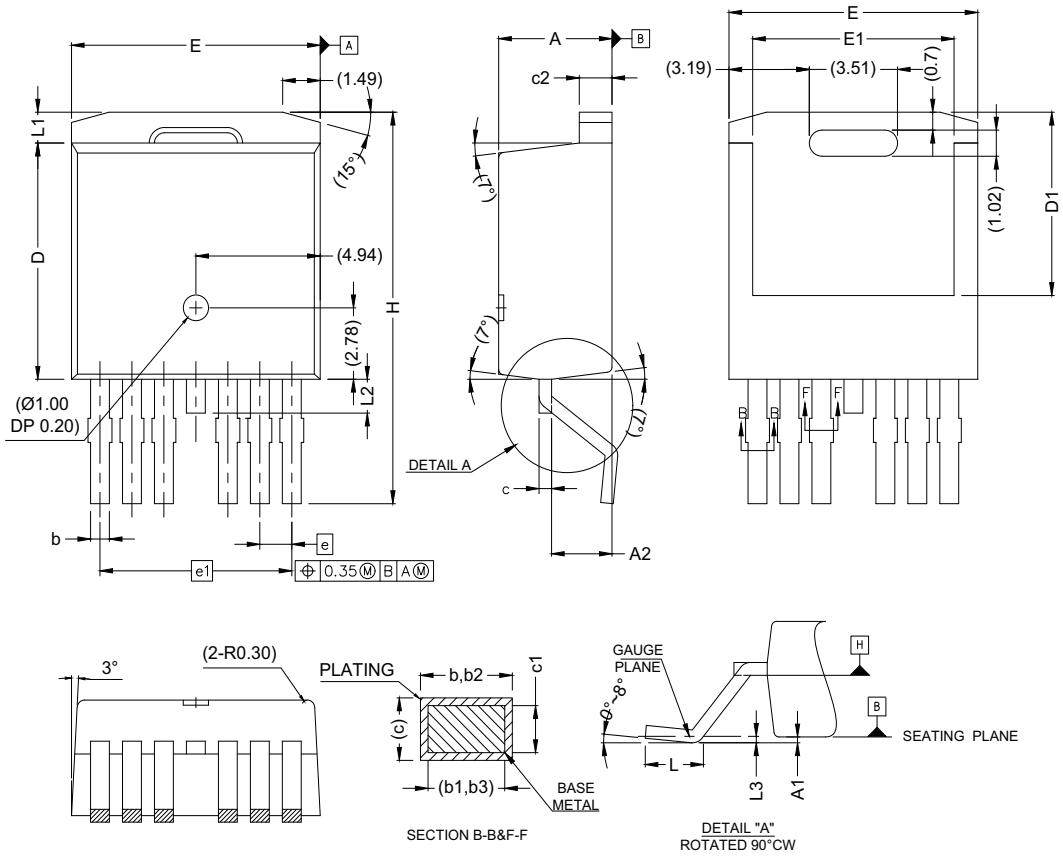
Notes

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
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	0.260	0.280	6.604	7.112
D2	0.046	0.050	1.168	1.270
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

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FOR FACILITY CODE "N"



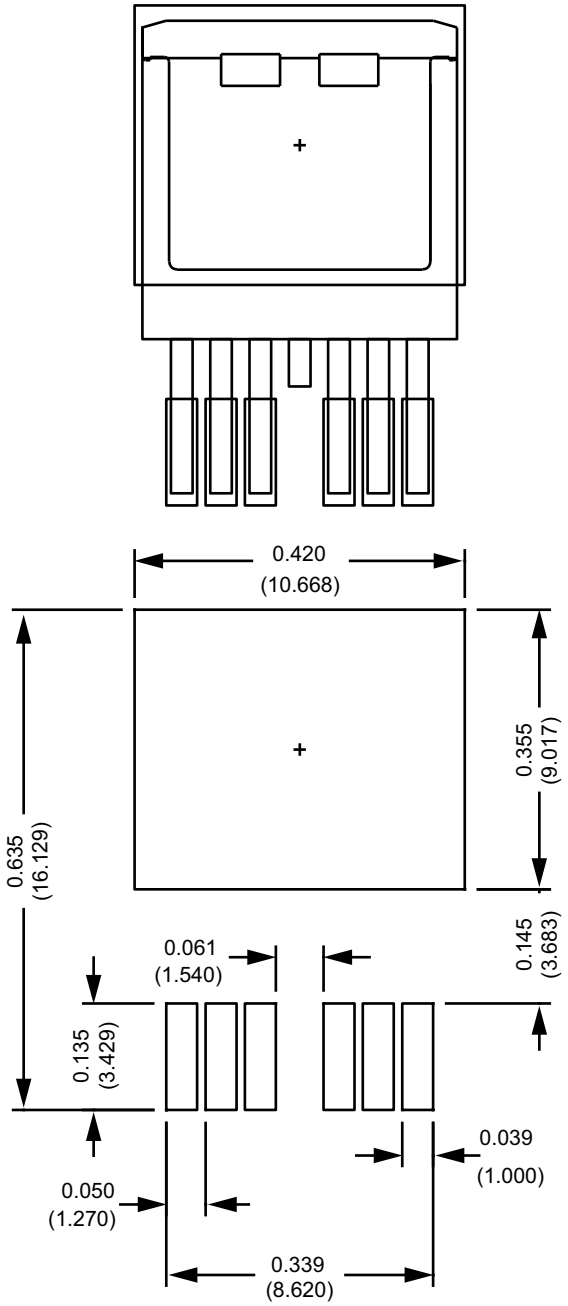
Notes

1. Dimensioning & toleranceing confirm to ASME Y14.5M-1994
2. All dimensions are in millimeters. Angles are in degrees
3. Radius on terminal is optional
4. General tolerances - linear ±0.05
5. Plastic body angles: 5° unless otherwise specified
6. Plastic body radius: max. 0.25 unless otherwise specified
7. Plastic body finishin: matt finishing ra = 1.7 ~ 2 microns
8. mismatch max.=0.05 (cavity to hole axis)}
9. Asterisked quotes are subjected to the SPC calculation (cp, k, cpk)

DIM.	MILLIMETERS	
	MIN.	MAX.
A	4.30	4.70
A1	-	0.25
A2	2.20	2.60
b	0.65	0.85
b1	0.65	0.80
b2	0.80	1.00
b3	0.80	0.95
c	0.45	0.60
c1	0.45	0.55
c2	1.25	1.40
D	9.00	9.40
D1	6.86	7.42
E	9.68	10.08
E1	7.70	8.30
e	1.27 BSC	
e1	7.62 BSC	
L	1.78	2.79
L1	-	1.60
L2	-	1.78
L3	0.25 BSC	
H	14.61	15.88
ECN: E26-0554-Rev. E, 19-Oct-2026 DWG: 6006		

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



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