



N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^{a, e}	Q_g (Typ)
30	0.0057 at $V_{GS} = 10$ V	90	30
	0.0078 at $V_{GS} = 4.5$ V	77	

FEATURES

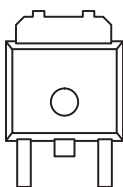
- TrenchFET[®] Power MOSFET
- Optimized for Low-Side Synchronous Rectifier Operation
- 100 % R_g Tested

Available
RoHS*
COMPLIANT

APPLICATIONS

- DC/DC Converters
- Synchronous Rectifiers

TO-252

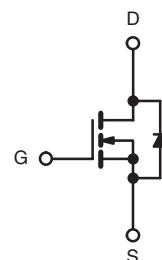


G D S

Top View

Drain Connected to Tab

Ordering Information: SUD50N03-06AP-E3 (Lead (Pb)-free)



N-Channel MOSFET

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}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	90 ^{a, e}
		$T_C = 70$ °C	75 ^{a, e}
		$T_A = 25$ °C	30 ^{b, c}
		$T_A = 70$ °C	25 ^{b, c}
Pulsed Drain Current	I_{DM}	100	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	55 ^{a, e}
		$T_A = 25$ °C	6.7 ^{b, c}
Avalanche Current Pulse	I_{AS}	45	mJ
Single Pulse Avalanche Energy	E_{AS}	101	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	83
		$T_C = 70$ °C	58
		$T_A = 25$ °C	10 ^{b, c}
		$T_A = 70$ °C	7 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	12	15	°C/W
Maximum Junction-to-Case	R_{thJC}	1.5	1.8	

Notes:

a. Based on $T_C = 25$ °C.

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

c. $t = 10$ sec.

d. Maximum under Steady State conditions is 50 °C/W.

e. Calculated based on maximum junction temperature. Package limitation current is 50 A.

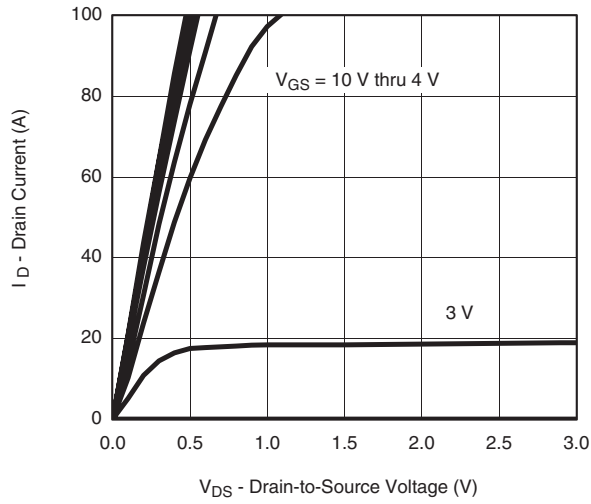
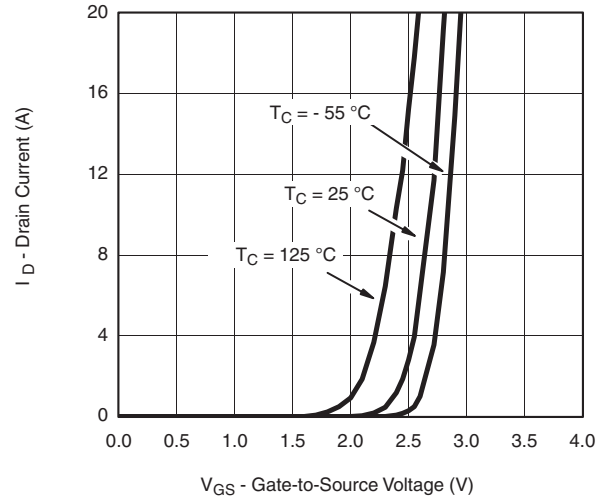
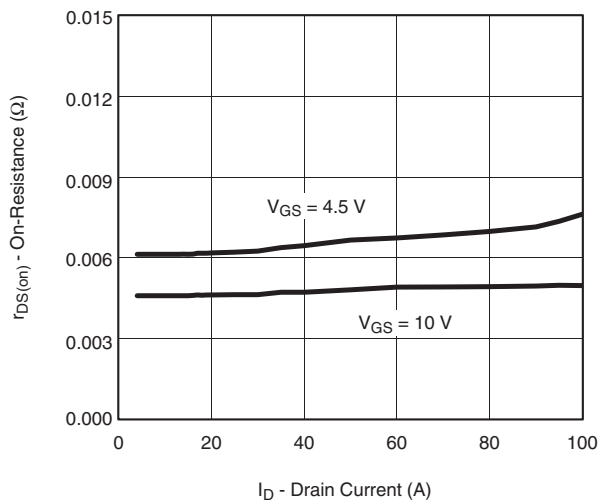
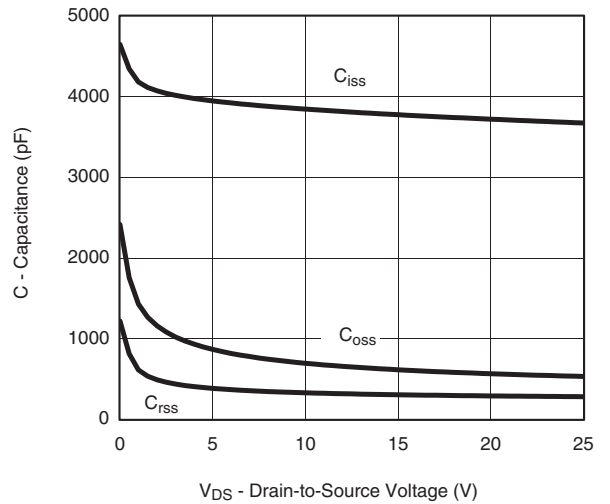
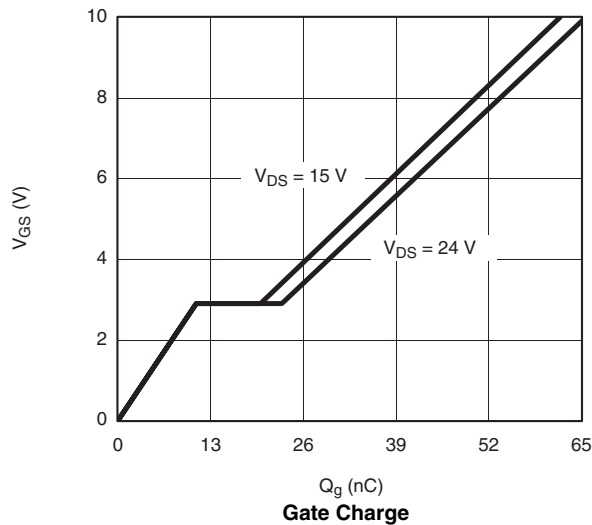
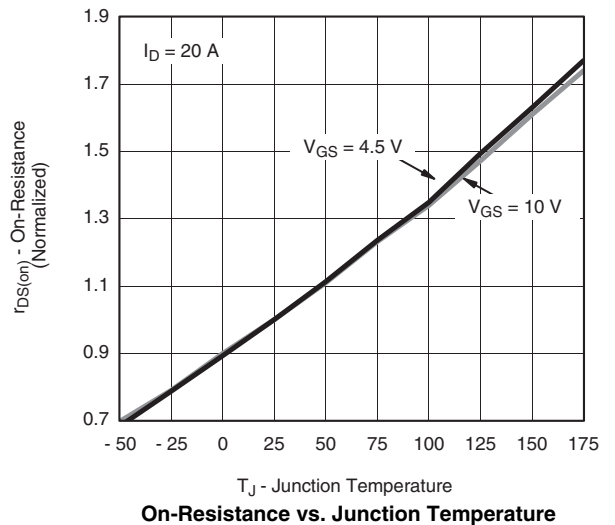
* Pb containing terminations are not RoHS compliant, exemptions may apply.

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 = 250 μA	30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		25		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 6.3		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.2		2.4	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 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			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	50			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0046	0.0057	Ω
		V _{GS} = 4.5 V, I _D = 20 A		0.0062	0.0078	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A		70		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		3800		pF
Output Capacitance	C _{oss}			615		
Reverse Transfer Capacitance	C _{rss}			305		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 30 A		62	95	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 25 A		30	45	
Gate-Source Charge	Q _{gs}			11		
Gate-Drain Charge	Q _{gd}			9		
Gate Resistance	R _g	f = 1 MHz		0.9	1.4	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 0.5 Ω I _D ≅ 30 A, V _{GEN} = 10 V, R _g = 1 Ω		12	18	ns
Rise Time	t _r			10	15	
Turn-Off Delay Time	t _{d(off)}			30	45	
Fall Time	t _f			8	12	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 0.6 Ω I _D ≅ 25 A, V _{GEN} = 4.5 V, R _g = 1 Ω		26	40	
Rise Time	t _r			230	345	
Turn-Off Delay Time	t _{d(off)}			25	40	
Fall Time	t _f			9	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			55 ^c	A
Pulse Diode Forward Current ^a	I _{SM}				100	
Body Diode Voltage	V _{SD}	I _S = 6.7 A		0.9	1.5	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 6.7 A, di/dt = 100 A/μs, T _J = 25 °C		65	100	ns
Body Diode Reverse Recovery Charge	Q _{rr}			38	60	nC
Reverse Recovery Fall Time	t _a			50		ns
Reverse Recovery Rise Time	t _b			15		

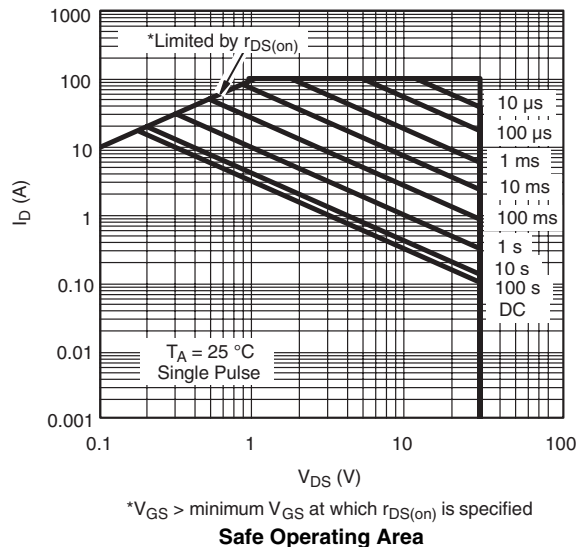
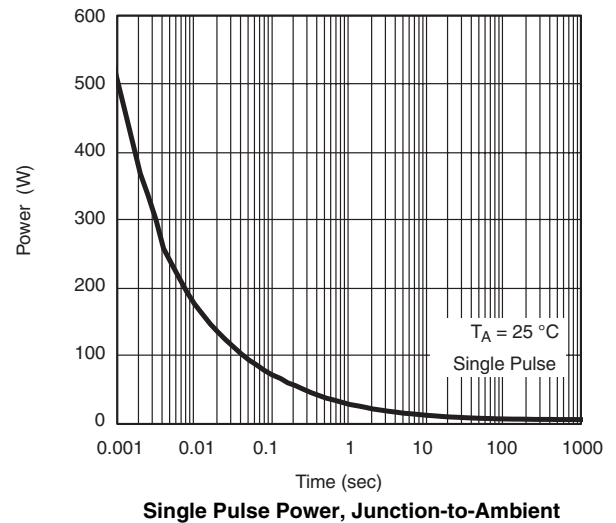
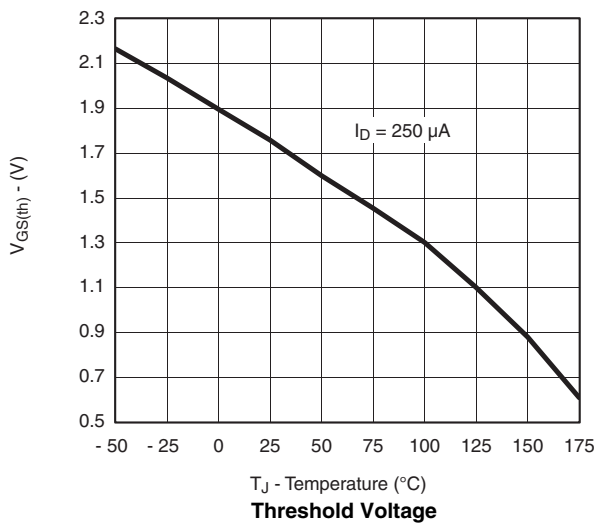
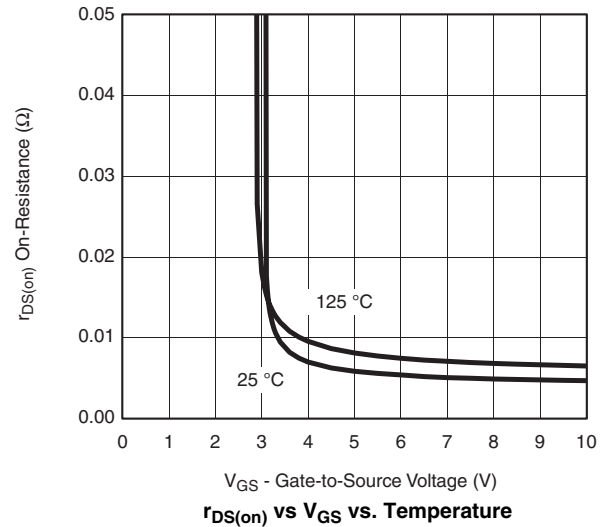
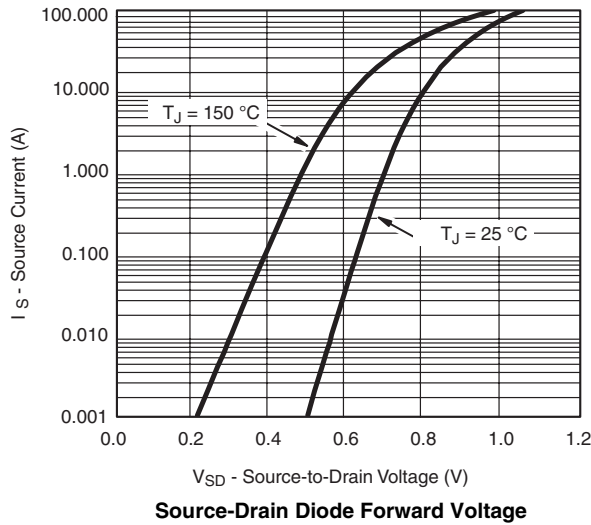
Notes:

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.
c. Calculated based on maximum junction temperature. Package limitation current is 50 A.

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.

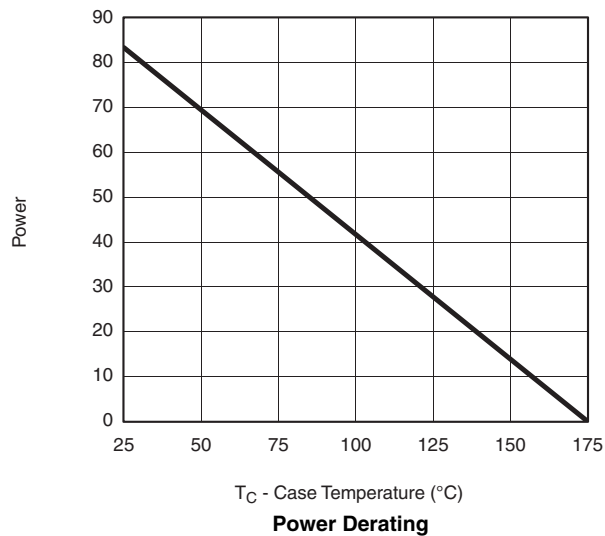
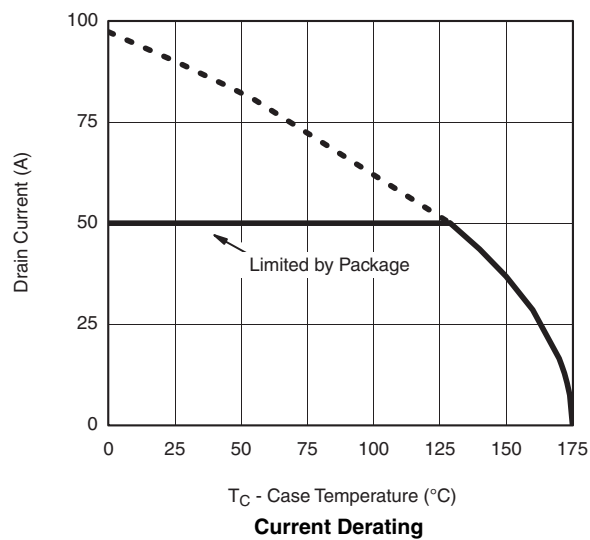
**TYPICAL CHARACTERISTICS** 25 °C unless noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

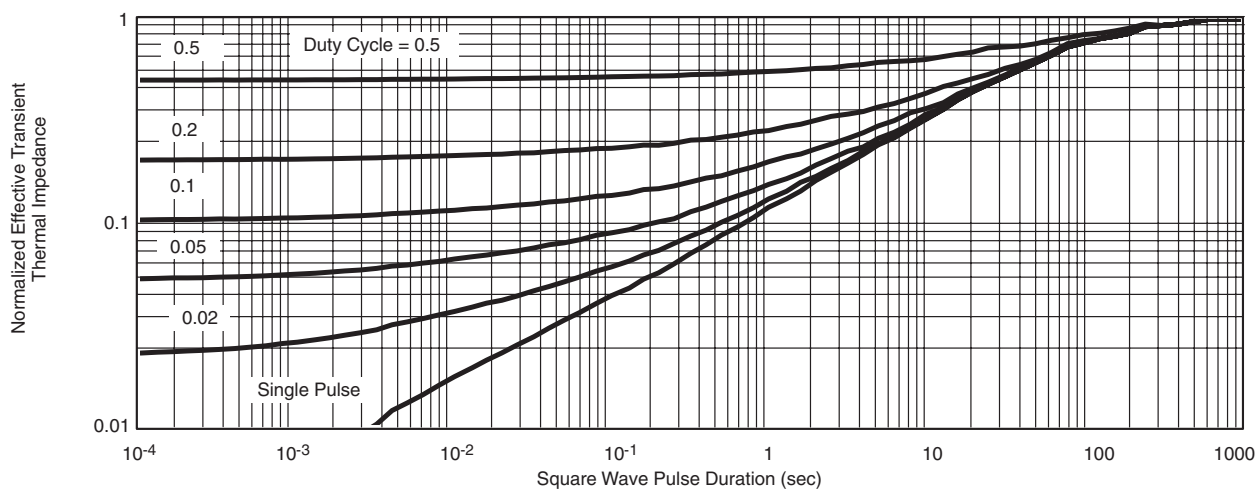
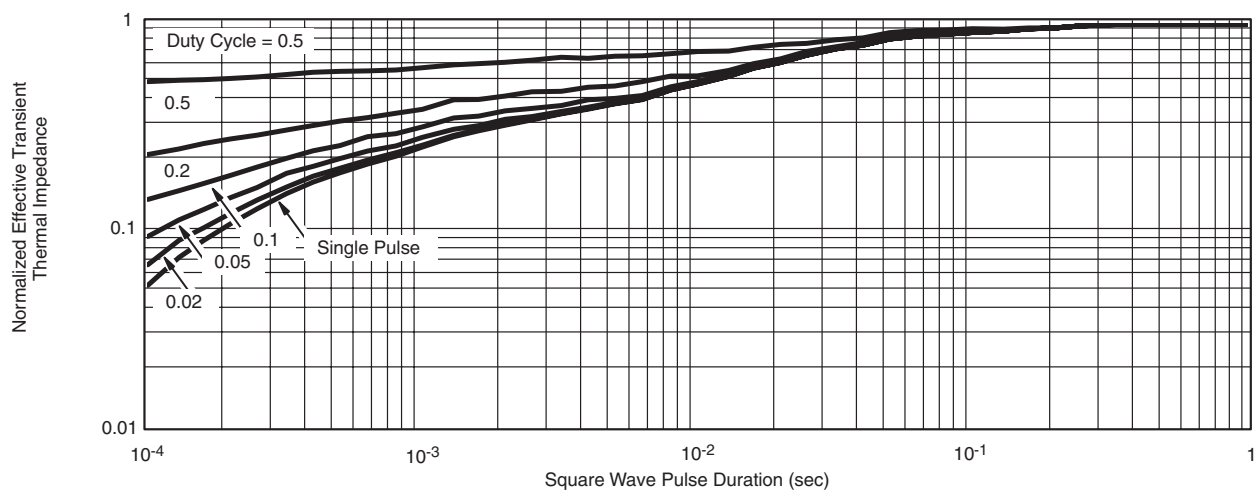
TYPICAL CHARACTERISTICS 25 °C unless noted





TYPICAL CHARACTERISTICS 25 °C unless noted



TYPICAL CHARACTERISTICS 25 °C unless noted**Normalized Thermal Transient Impedance, Junction-to-Ambient****Normalized Thermal Transient Impedance, Junction-to-Case**

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TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y



MILLIMETERS		
DIM.	MIN.	MAX.
A	2.18	2.38
A1	-	0.127
b	0.64	0.88
b2	0.76	1.14
b3	4.95	5.46
C	0.46	0.61
C2	0.46	0.89
D	5.97	6.22
D1	4.10	-
E	6.35	6.73
E1	4.32	-
H	9.40	10.41
e	2.28 BSC	
e1	4.56 BSC	
L	1.40	1.78
L3	0.89	1.27
L4	-	1.02
L5	1.01	1.52

Note

- Dimension L3 is for reference only



VERSION 2: FACILITY CODE = N



DIM.	MILLIMETERS	
	MIN.	MAX.
A	2.18	2.39
A1	-	0.13
b	0.65	0.89
b1	0.64	0.79
b2	0.76	1.13
b3	4.95	5.46
c	0.46	0.61
c1	0.41	0.56
c2	0.46	0.60
D	5.97	6.22
D1	5.21	-
E	6.35	6.73
E1	4.32	-
e	2.29 BSC	
H	9.94	10.34

DIM.	MILLIMETERS	
	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
θ	0°	10°
θ1	0°	15°
θ2	25°	35°

Notes

- Dimensioning and tolerance confirm to ASME Y14.5M-1994
- All dimensions are in millimeters. Angles are in degrees
- Heat sink side flash is max. 0.8 mm
- Radius on terminal is optional

ECN: E22-0399-Rev. R, 03-Oct-2022
DWG: 5347

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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