



**THE DATASHEET OF
SUD50N03-06AP-T4E3**





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

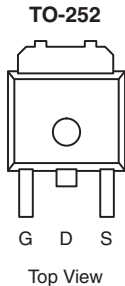
- TrenchFET[®] Power MOSFET
- Optimized for Low-Side Synchronous Rectifier Operation
- 100 % R_g Tested



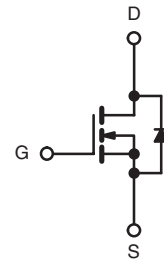
Available
RoHS*
COMPLIANT

APPLICATIONS

- DC/DC Converters
- Synchronous Rectifiers



Drain Connected to Tab



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

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	
		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 $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		25		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 6.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.2		2.4	V
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}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.0046	0.0057	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		0.0062	0.0078	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 30\text{ A}$		70		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		3800		pF
Output Capacitance	C_{oss}			615		
Reverse Transfer Capacitance	C_{rss}			305		
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		62	95	nC
				30	45	
Gate-Source Charge	Q_{gs}	$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 25\text{ A}$		11		
Gate-Drain Charge	Q_{gd}			9		
Gate Resistance	R_g	$f = 1\text{ MHz}$		0.9	1.4	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 0.5\text{ }\Omega$ $I_D \cong 30\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		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	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 25\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		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	$T_C = 25\text{ }^\circ\text{C}$			55 ^c	A
Pulse Diode Forward Current ^a	I_{SM}				100	
Body Diode Voltage	V_{SD}	$I_S = 6.7\text{ A}$		0.9	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 6.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		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		

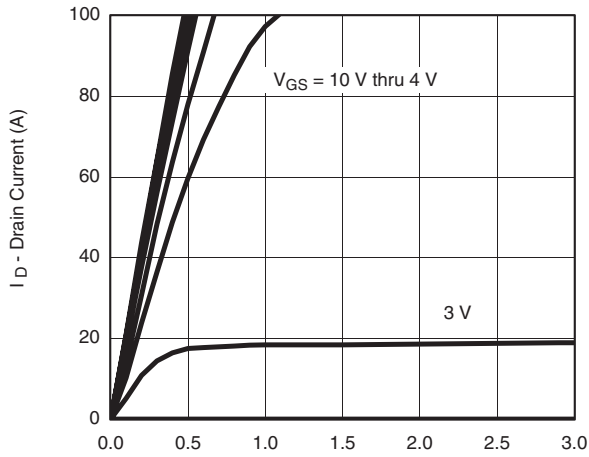
Notes:

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

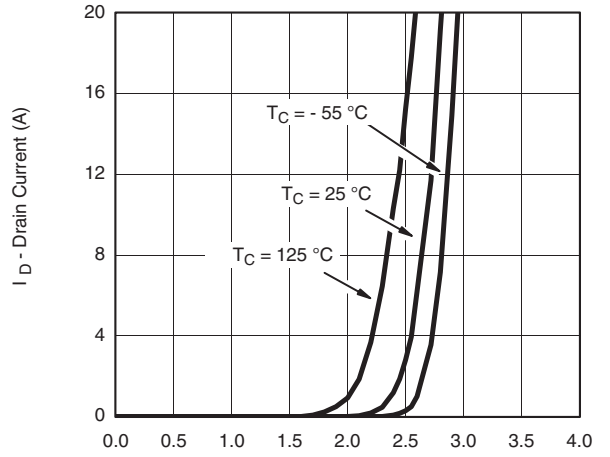
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



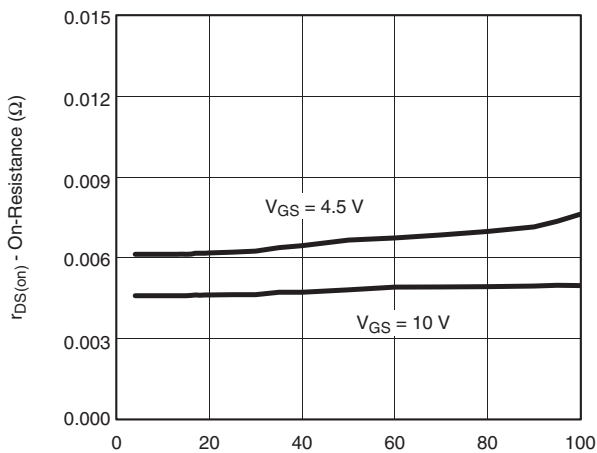
TYPICAL CHARACTERISTICS 25 °C unless noted



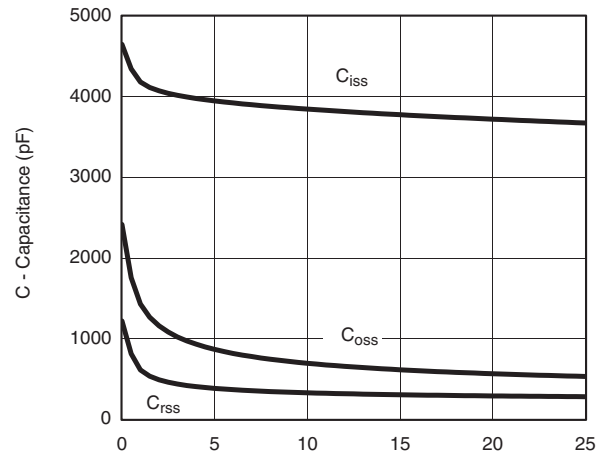
Output Characteristics



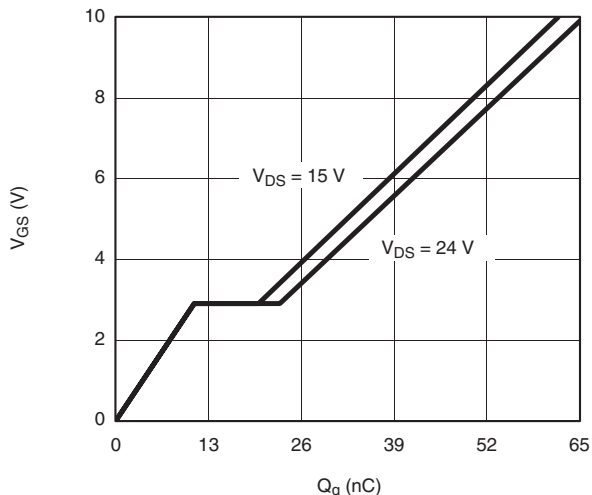
Transfer Characteristics



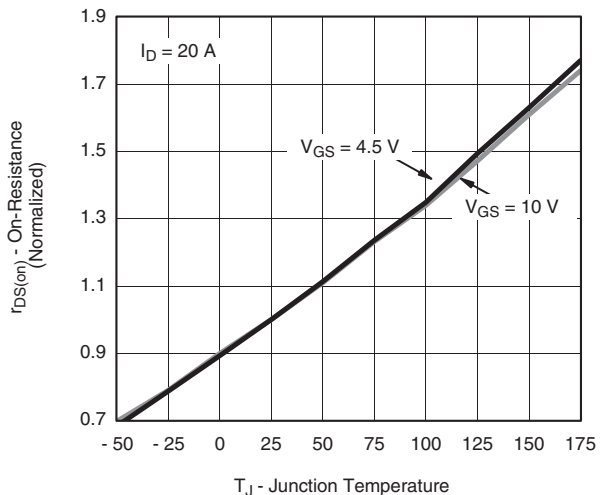
On-Resistance vs. Drain Current



Capacitance



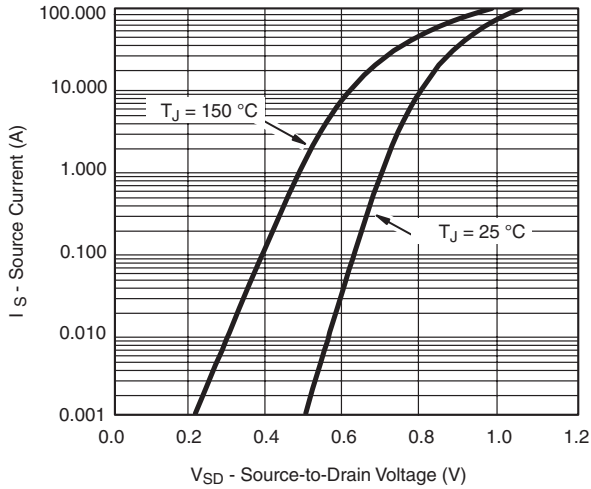
Gate Charge



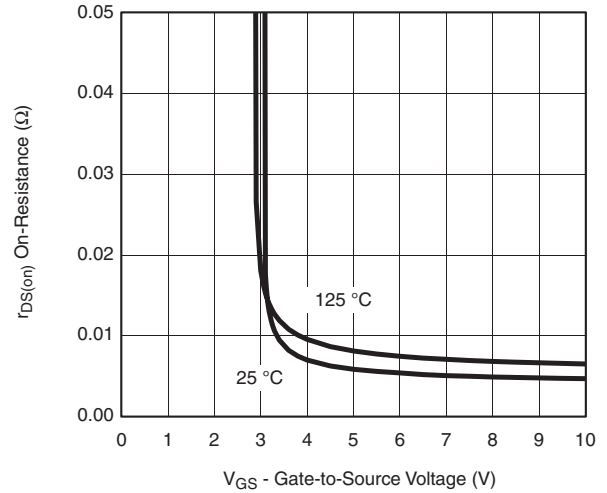
On-Resistance vs. Junction Temperature



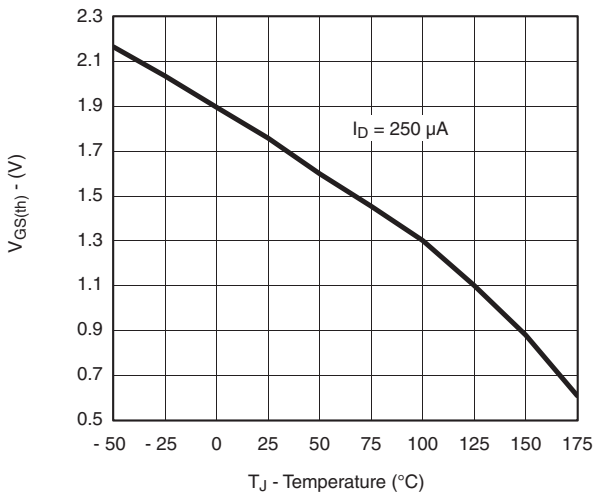
TYPICAL CHARACTERISTICS 25 °C unless noted



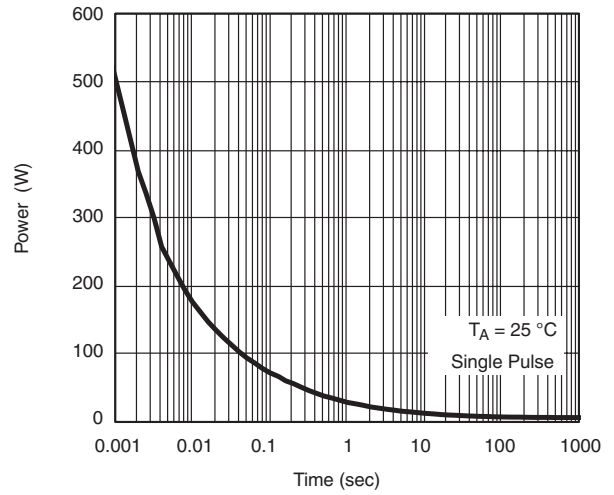
Source-Drain Diode Forward Voltage



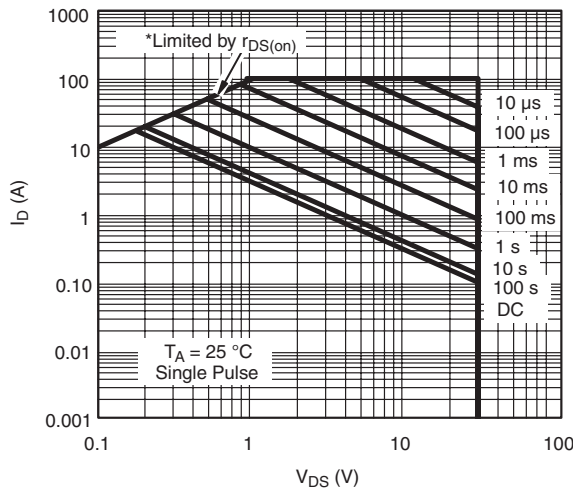
$r_{DS(on)}$ vs V_{GS} vs. Temperature



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

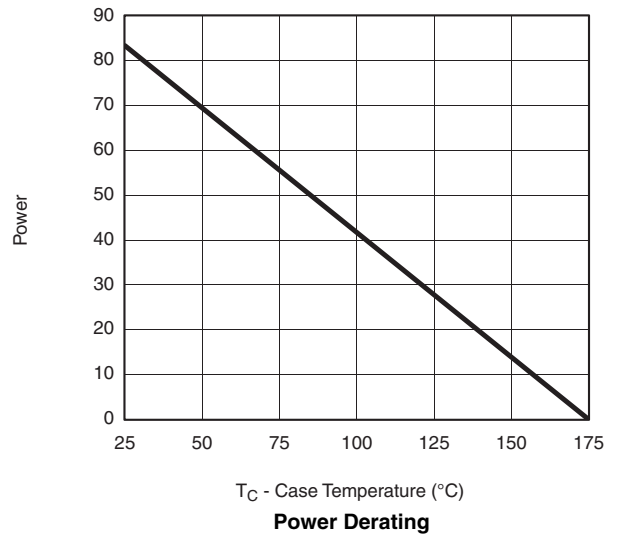
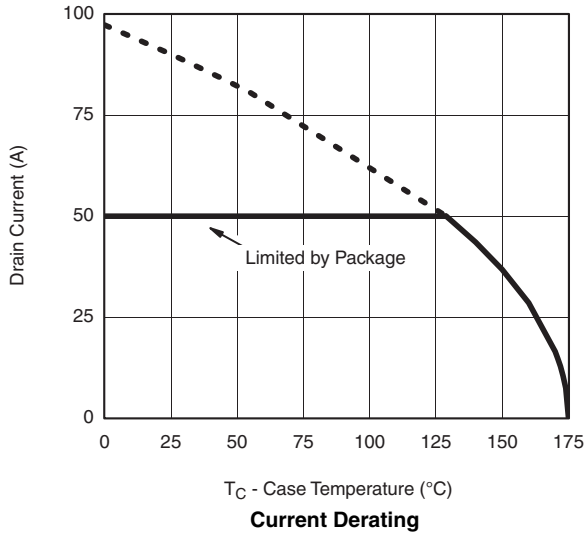


* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified

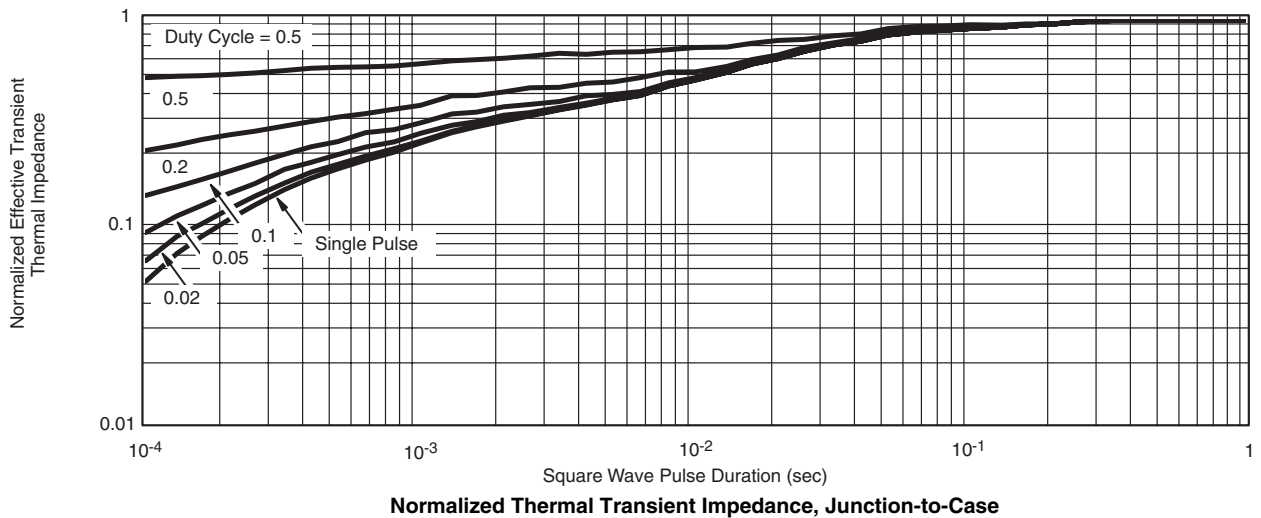
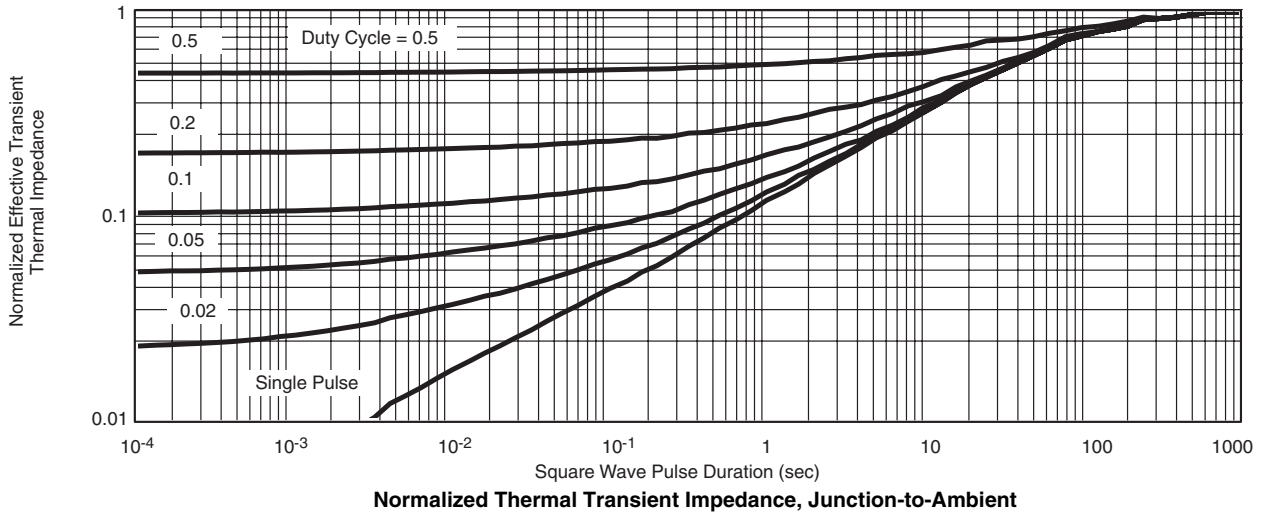
Safe Operating Area



TYPICAL CHARACTERISTICS 25 °C unless noted



TYPICAL CHARACTERISTICS 25 °C unless noted



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TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y



DIM.	MILLIMETERS	
	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



MILLIMETERS		
DIM.	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

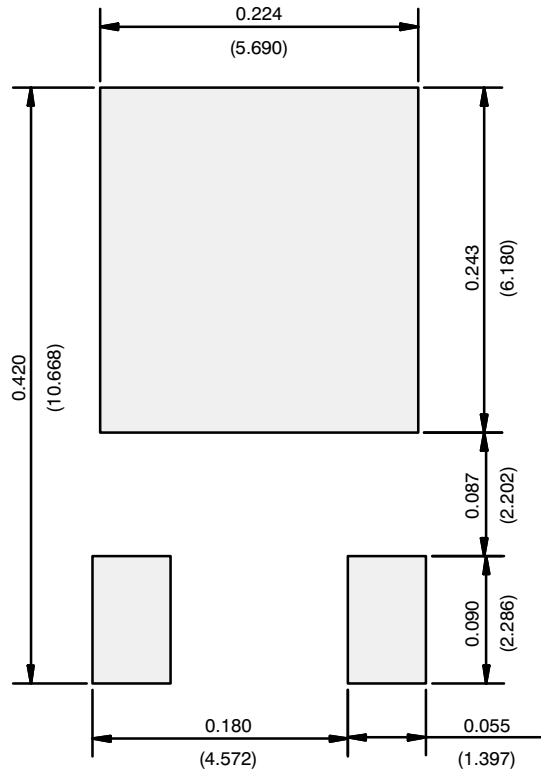
MILLIMETERS		
DIM.	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
θ	0°	10°
θ1	0°	15°
θ2	25°	35°

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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