



N-Channel 25-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	r _{DS(on)} (Ω)	I _D (A) ^{a, e}	Q _g (Typ)
25	0.0062 at V _{GS} = 10 V	78	20.5 nC
	0.010 at V _{GS} = 4.5 V	62	

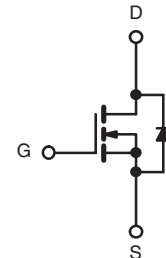
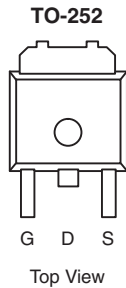
FEATURES

- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- RoHS Compliant



APPLICATIONS

- DC/DC Conversion, Low-Side
- Desktop PC



Ordering Information: SUD50N025-06P-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	25	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 175 °C)	I _D	T _C = 25 °C	78 ^{a, e}	A
		T _C = 70 °C	65 ^{a, e}	
		T _A = 25 °C	32 ^{b, c}	
		T _A = 70 °C	25 ^{b, c}	
Pulsed Drain Current	I _{DM}	100		
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	43	
		T _A = 25 °C	7.1 ^{b, c}	
Avalanche Current Pulse	I _{AS}	35		
Single Pulse Avalanche Energy	E _{AS}	61.25	mJ	
Maximum Power Dissipation	P _D	T _C = 25 °C	65 ^a	W
		T _C = 70 °C	45 ^a	
		T _A = 25 °C	10.7 ^{b, c}	
		T _A = 70 °C	7.5 ^{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}	11	14	°C/W
Maximum Junction-to-Case	R _{thJC}	1.9	2.3	

Notes:

- Based on T_C = 25 °C.
- Surface Mounted on 1" x 1" FR4 board.
- t = 10 sec.
- Maximum under Steady State conditions is 90 °C/W.
- Calculated based on maximum junction temperature. Package limitation current is 50 A.



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}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	25			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		20		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.4		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}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			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	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.0051	0.0062	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$		0.0081	0.010	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		55		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 12\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2490		pF
Output Capacitance	C_{oss}			530		
Reverse Transfer Capacitance	C_{rss}			280		
Total Gate Charge	Q_g	$V_{DS} = 12\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		44	66	nC
		$V_{DS} = 12\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 50\text{ A}$		20.5	31	
Gate-Source Charge	Q_{gs}	$V_{DS} = 12\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 50\text{ A}$		7.5		
Gate-Drain Charge	Q_{gd}			7.0		
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.55	1.1	1.65	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 12\text{ V}, R_L = 0.24\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		19	28	ns
Rise Time	t_r			12	18	
Turn-Off Delay Time	$t_{d(off)}$			18	27	
Fall Time	t_f			7	11	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 12\text{ V}, R_L = 0.24\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		9	14	
Rise Time	t_r			11	16.5	
Turn-Off Delay Time	$t_{d(off)}$			24	36	
Fall Time	t_f			8	12	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			43	A
Pulse Diode Forward Current ^a	I_{SM}				100	
Body Diode Voltage	V_{SD}	$I_S = 30\text{ A}$		0.9	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		30	45	ns
Body Diode Reverse Recovery Charge	Q_{rr}			20	30	nC
Reverse Recovery Fall Time	t_a			13.5		ns
Reverse Recovery Rise Time	t_b			16.5		

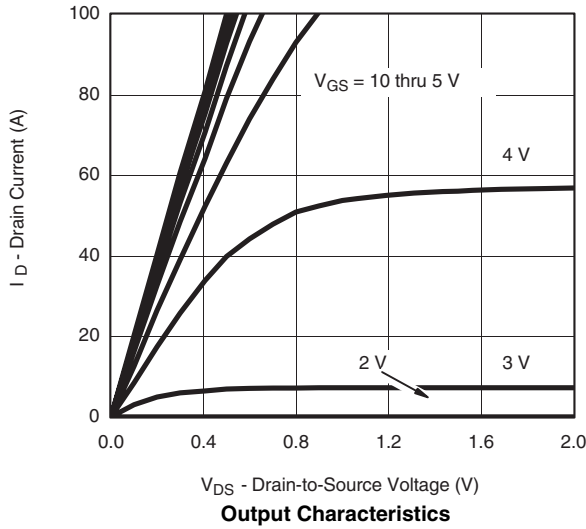
Notes:

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

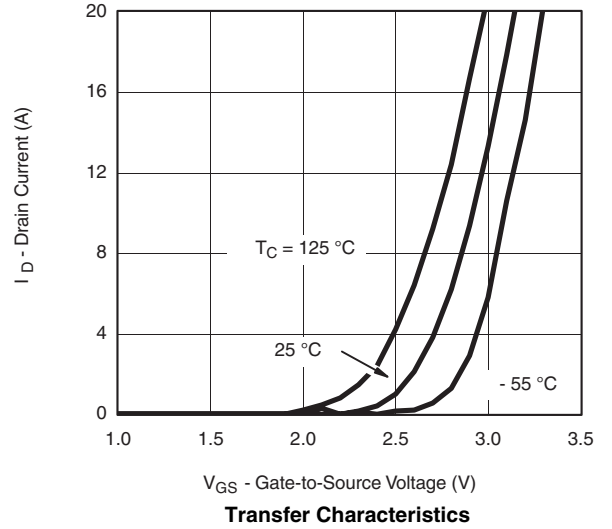
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



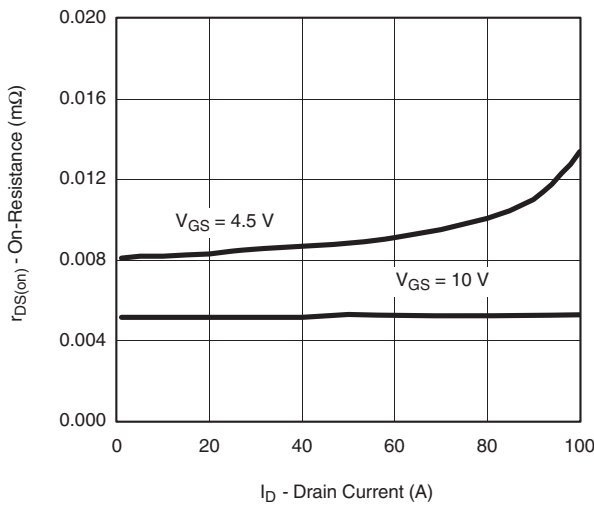
TYPICAL CHARACTERISTICS 25 °C unless noted



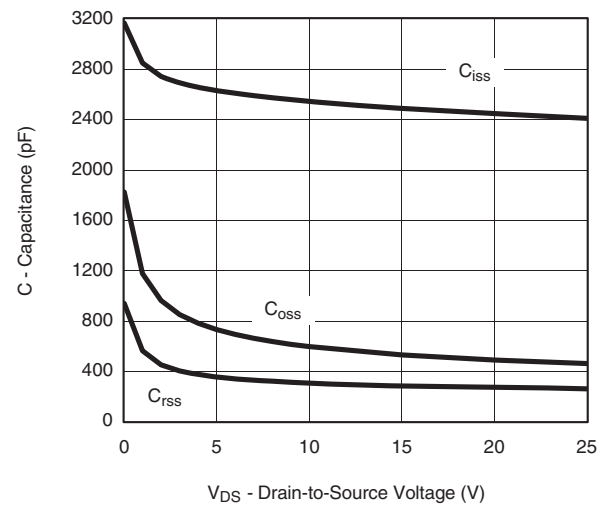
Output Characteristics



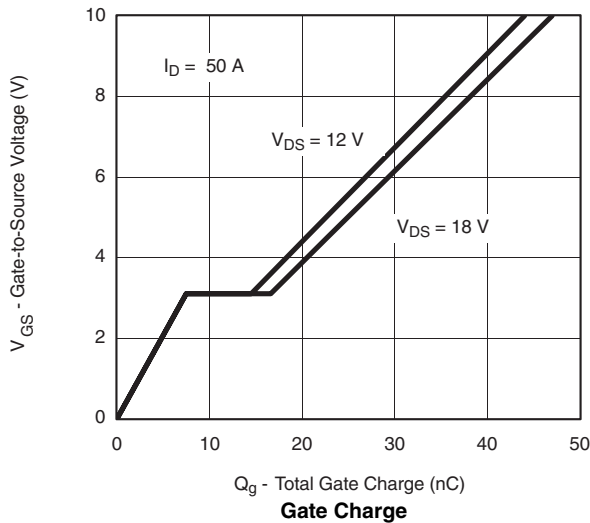
Transfer Characteristics



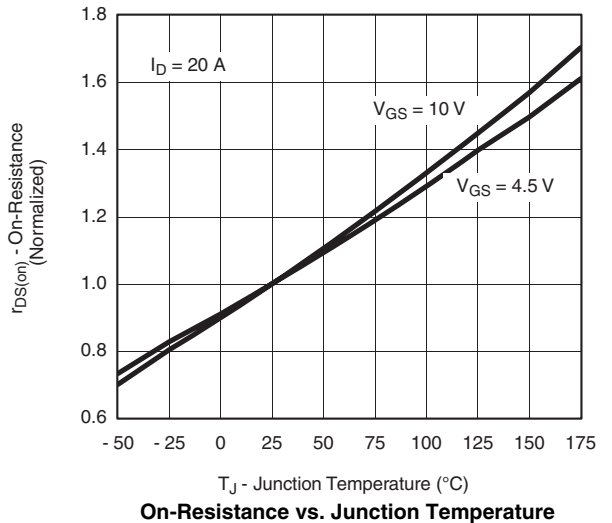
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



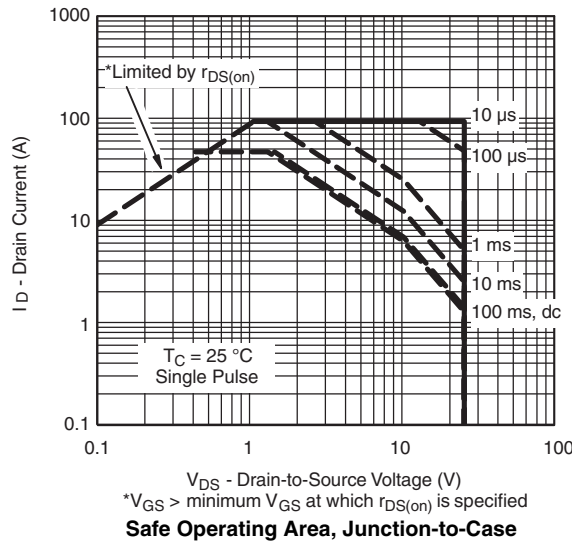
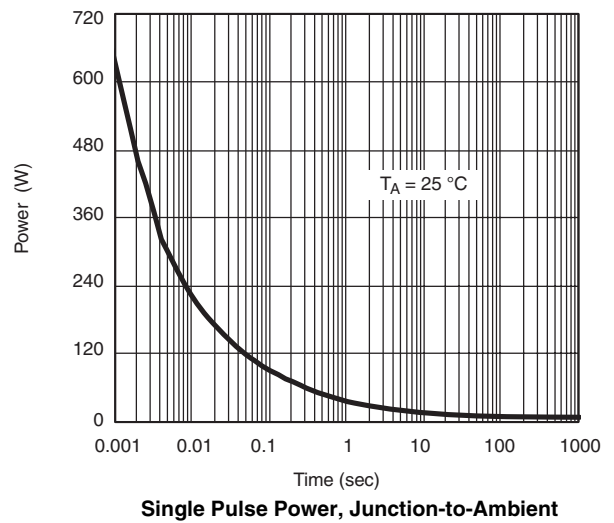
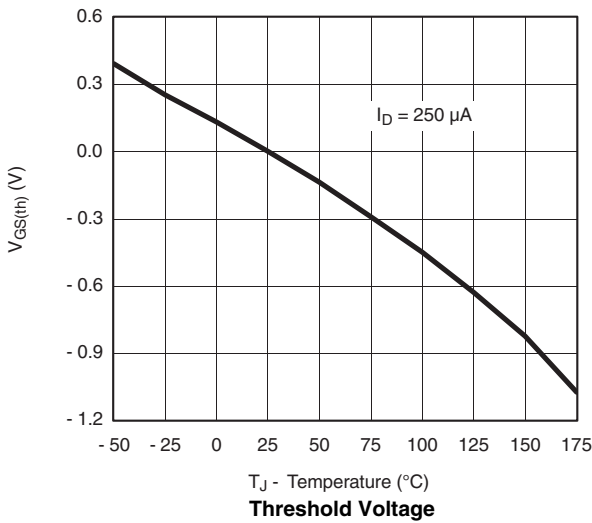
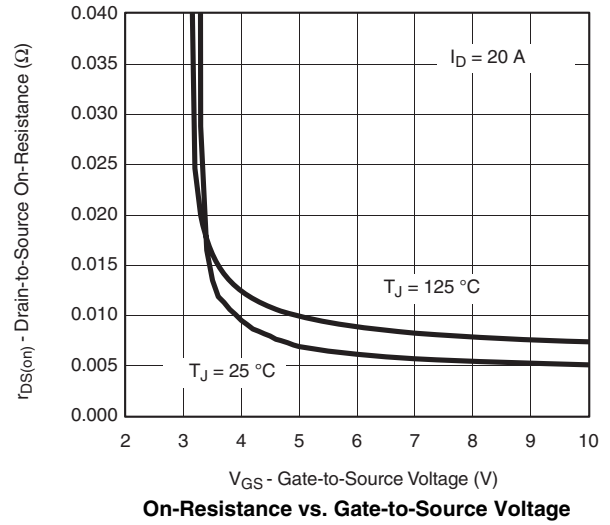
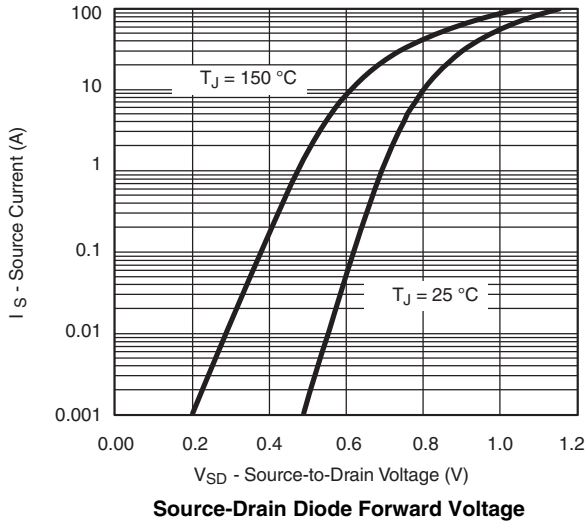
Gate Charge



On-Resistance vs. Junction Temperature

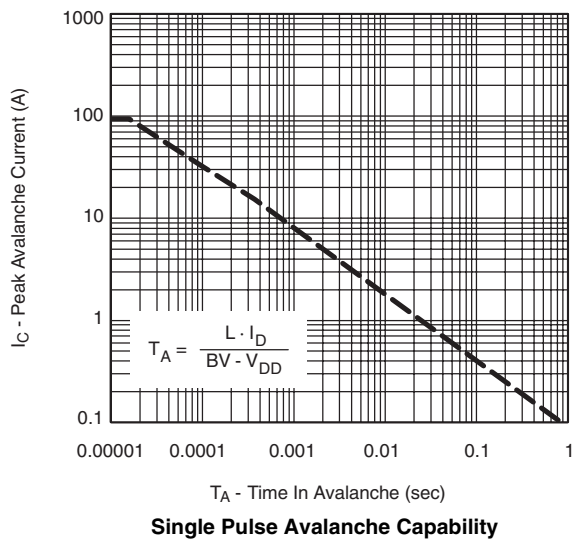
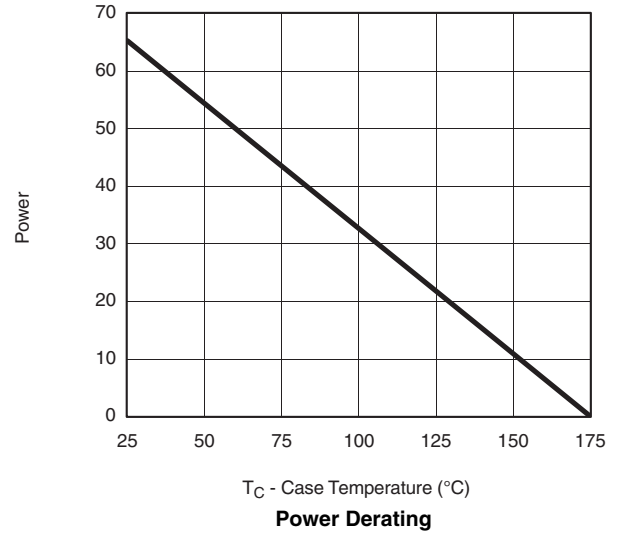
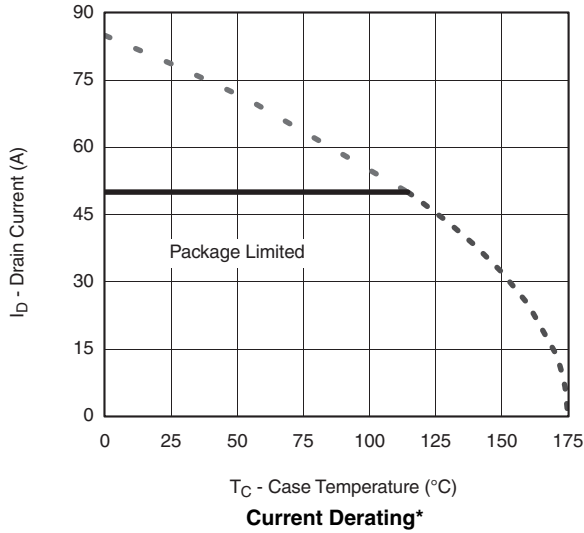


TYPICAL CHARACTERISTICS 25 °C unless noted



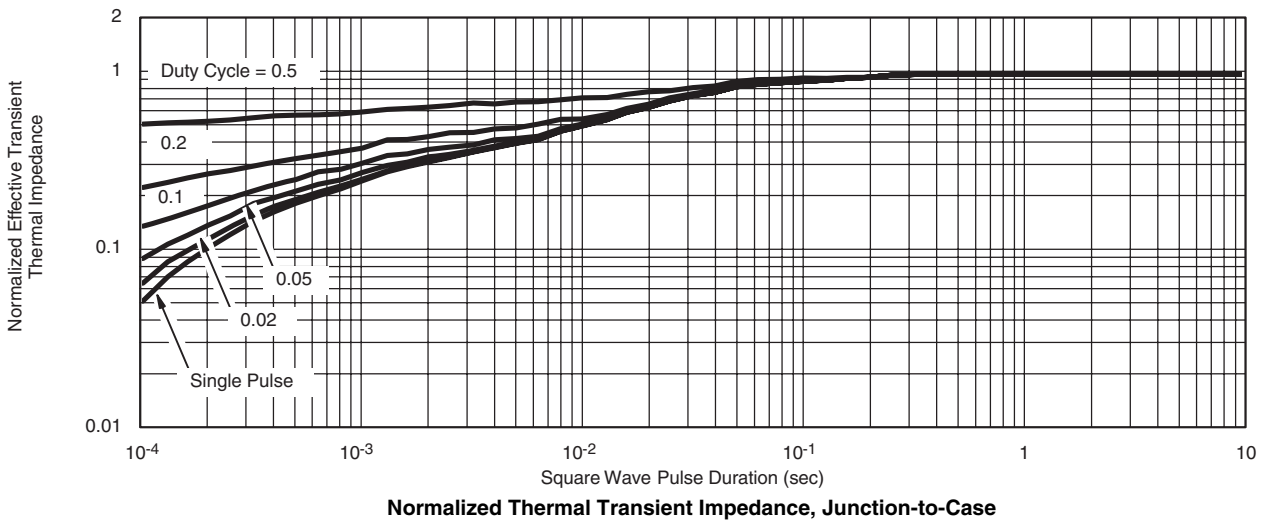
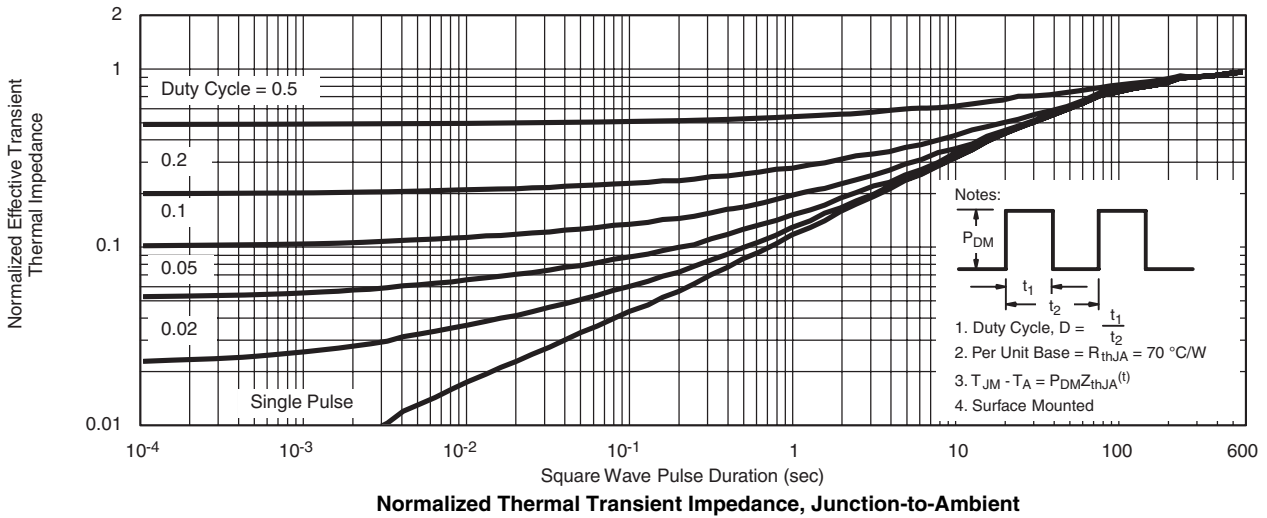


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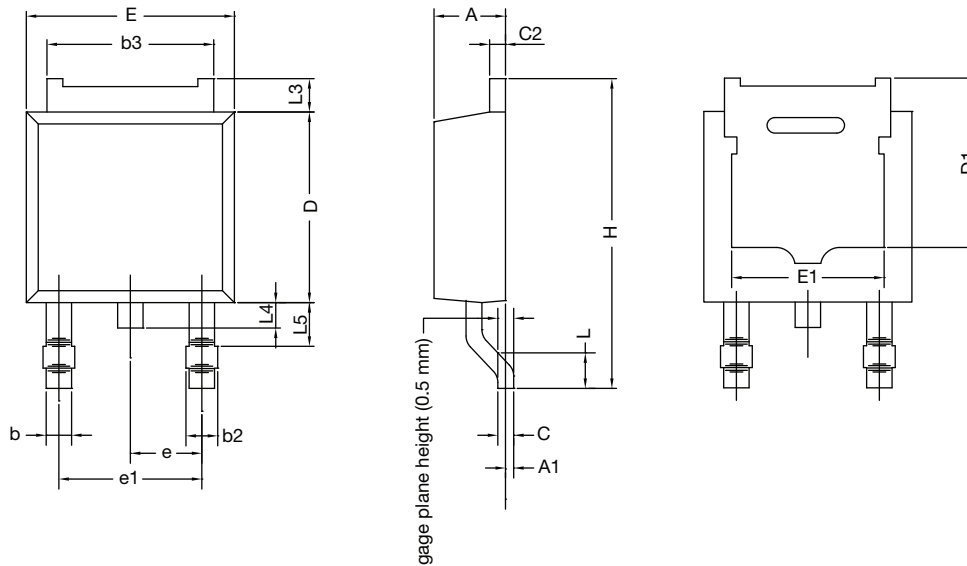
*The power dissipation P_D is based on $T_{J(max)} = 175\text{ }^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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: E19-0649-Rev. Q, 16-Dec-2019
 DWG: 5347

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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