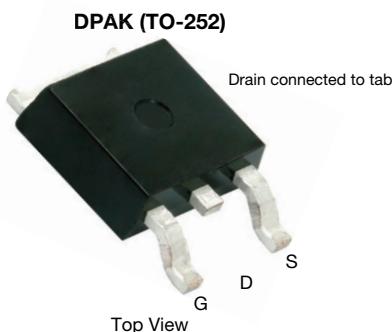
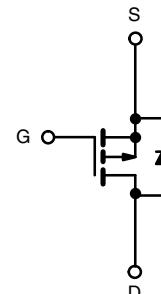


P-Channel 40 V (D-S), 175 °C MOSFET



FEATURES

- TrenchFET® power MOSFETs
- 175 °C junction temperature
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT


P-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	-40
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -10$ V	0.0094
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -4.5$ V	0.0145
I_D (A) ^d	-50
Configuration	Single

ORDERING INFORMATION

Package	DPAK (TO-252)
Lead (Pb)-free	SUD50P04-09L-E3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	-40	
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($T_J = 175$ °C)	I_D	-50 ^d	A
		-50 ^d	
Pulsed drain current	I_{DM}	-100	
Avalanche current	I_{AS}	-50	
Single avalanche energy ^a	E_{AS}	125	mJ
Power dissipation	P_D	136 ^c	W
		3 ^{b, c}	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Junction-to-ambient ^b	$t \leq 10$ s	15	18	°C/W
	Steady state	40	50	
Junction-to-case	R_{thJC}	0.82	1.1	

Notes

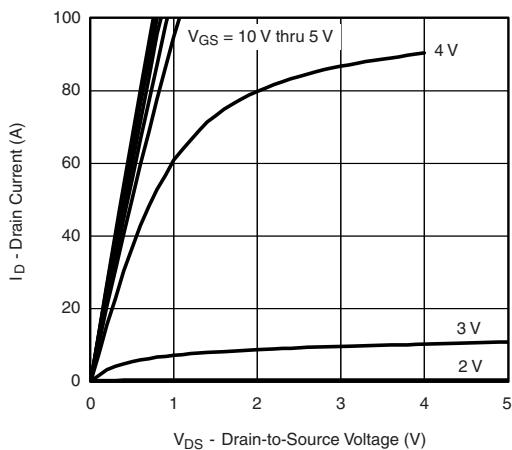
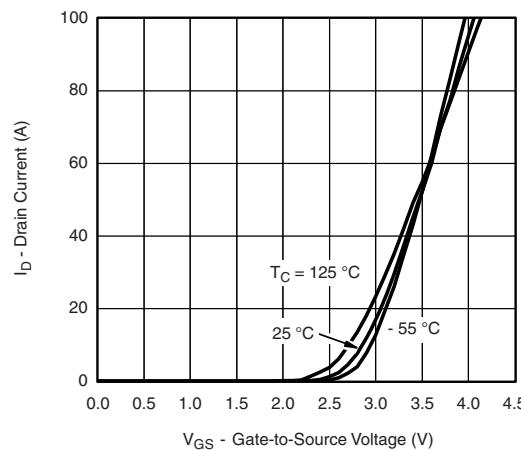
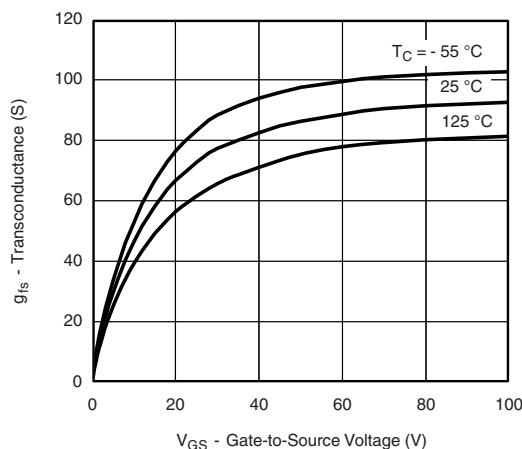
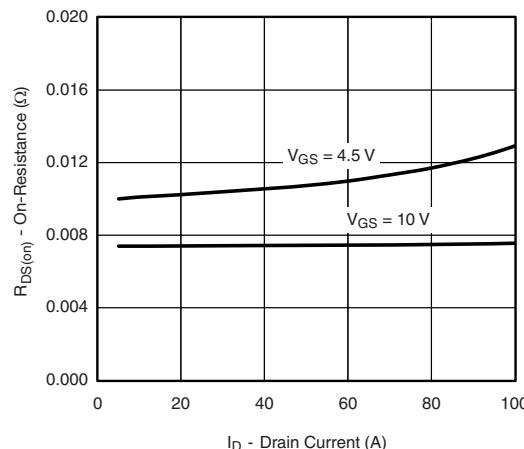
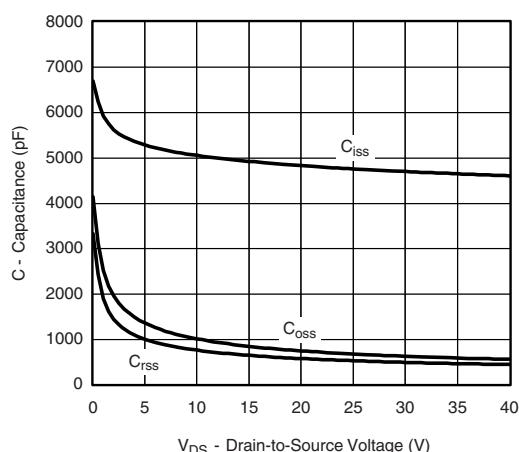
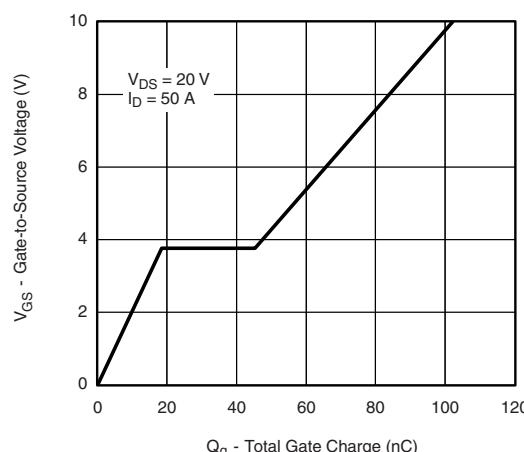
- Duty cycle $\leq 1\%$
- When mounted on 1" square PCB (FR4 material)
- See SOA curve for voltage derating
- Package limited

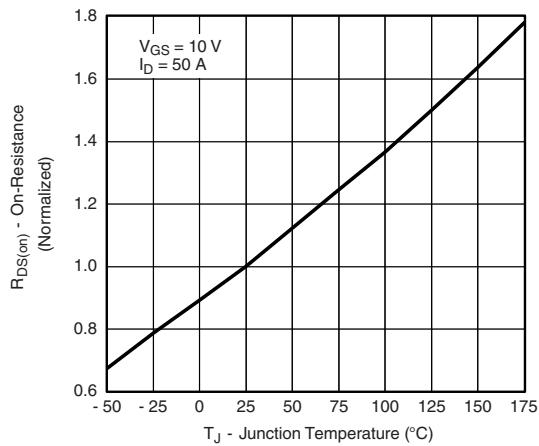
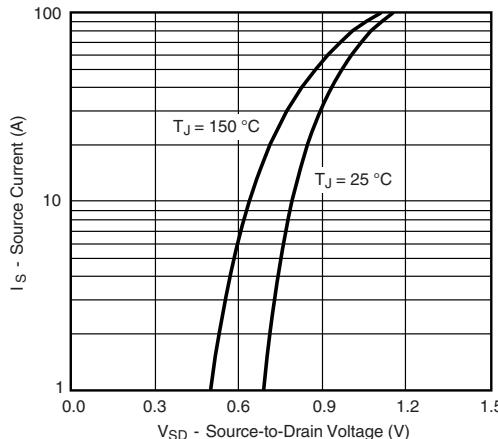
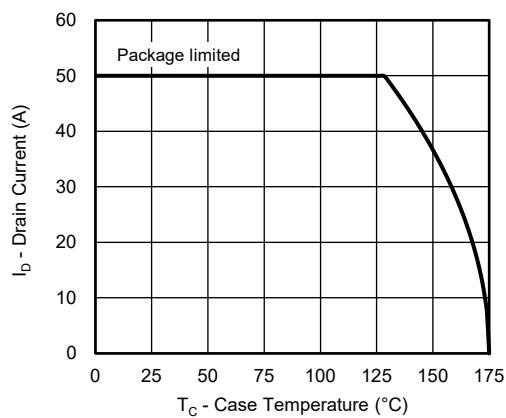
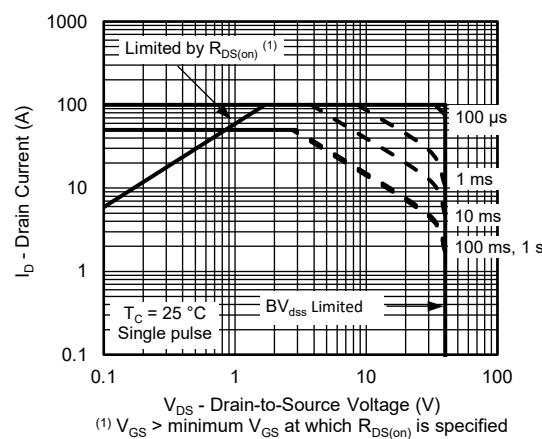
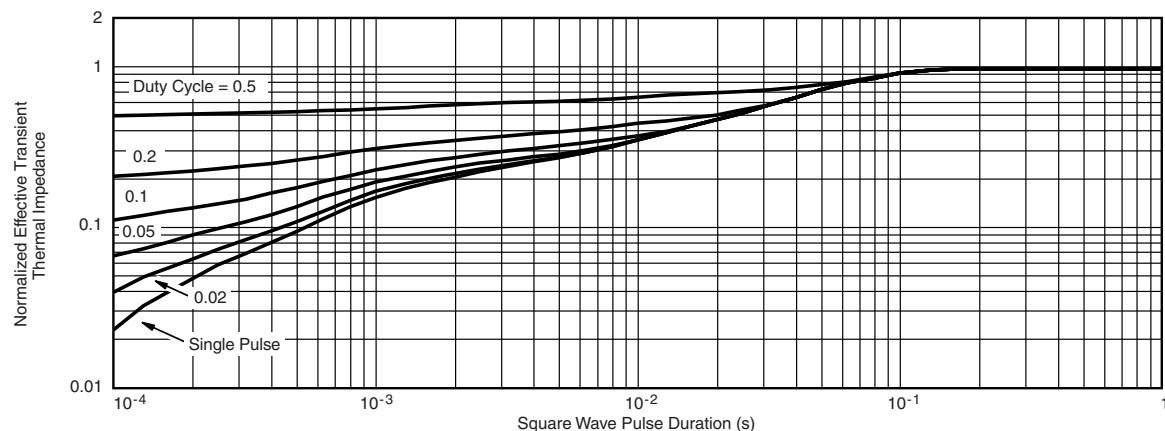
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = -250 \mu\text{A}$	-40	-	-	V
Gate threshold voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = -250 \mu\text{A}$	-1	-	-3	
Gate-body leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -32 \text{ V}$, $V_{GS} = 0 \text{ V}$	-	-	-1	
		$V_{DS} = -32 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 125^\circ\text{C}$	-	-	-50	
		$V_{DS} = -32 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 175^\circ\text{C}$	-	-	-150	
On-state drain current ^a	$I_{D(\text{on})}$	$V_{DS} = -5 \text{ V}$, $V_{GS} = -10 \text{ V}$	-50	-	-	A
Drain-source on-state resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = -10 \text{ V}$, $I_D = -24 \text{ A}$	-	0.0075	0.0094	
		$V_{GS} = -10 \text{ V}$, $I_D = -50 \text{ A}$, $T_J = 125^\circ\text{C}$	-	-	0.0140	
		$V_{GS} = -10 \text{ V}$, $I_D = -50 \text{ A}$, $T_J = 175^\circ\text{C}$	-	-	0.0170	
		$V_{GS} = -4.5 \text{ V}$, $I_D = -18 \text{ A}$	-	0.0115	0.0145	
Forward transconductance ^a	g_{fs}	$V_{DS} = -5 \text{ V}$, $I_D = -24 \text{ A}$	-	73	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$, $V_{DS} = -25 \text{ V}$, $f = 1 \text{ MHz}$	-	4800	-	
Output capacitance	C_{oss}		-	700	-	
Reverse transfer capacitance	C_{rss}		-	550	-	
Total gate charge ^c	Q_g	$V_{DS} = -20 \text{ V}$, $V_{GS} = -10 \text{ V}$, $I_D = -50 \text{ A}$	-	102	150	
Gate-source charge ^c	Q_{gs}		-	18.5	-	
Gate-drain charge ^c	Q_{gd}		-	27	-	
Turn-on delay time ^c	$t_{d(\text{on})}$	$V_{DD} = -20 \text{ V}$, $R_L = 0.4 \Omega$ $I_D \geq -50 \text{ A}$, $V_{GEN} = -10 \text{ V}$, $R_g = 6 \Omega$	-	10	15	
Rise time ^c	t_r		-	60	90	
Turn-off delay time ^c	$t_{d(\text{off})}$		-	145	220	
Fall time ^c	t_f		-	140	220	
Source Drain-Diode Ratings and Characteristics ^b ($T_C = 25^\circ\text{C}$)						
Continuous current	I_S		-	-	-50	
Pulsed current	I_{SM}		-	-	-100	
Forward voltage ^a	V_{SD}	$I_F = -50 \text{ A}$, $V_{GS} = 0 \text{ V}$	-	-1	-1.5	V
Reverse recovery time	t_{rr}	$I_F = -50 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$	-	55	85	ns

Notes

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

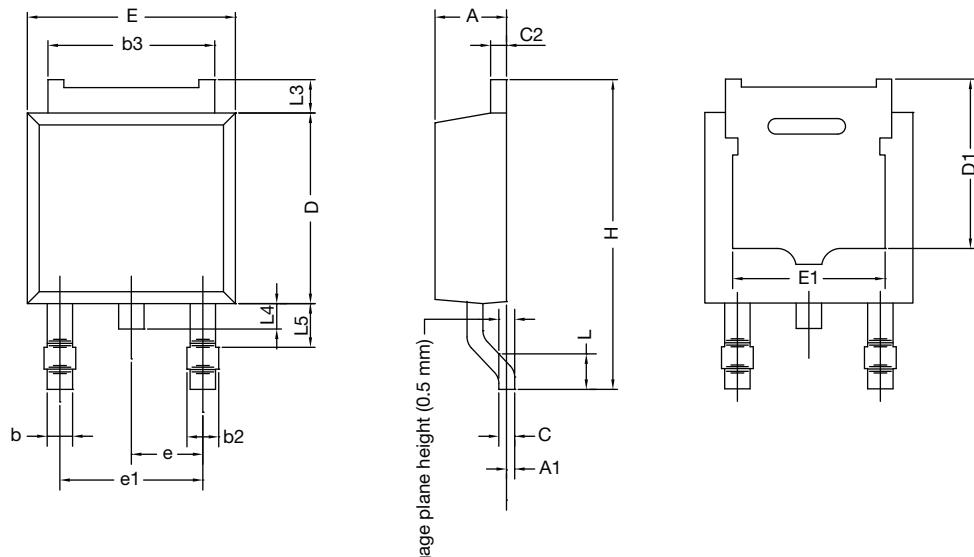
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage
THERMAL RATINGS

Max. Avalanche and Drain Current vs. Case Temperature

Safe Operating Area

Normalized Thermal Transient Impedance, Junction-to-Case

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for silicon technology and package reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?72243.

TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y

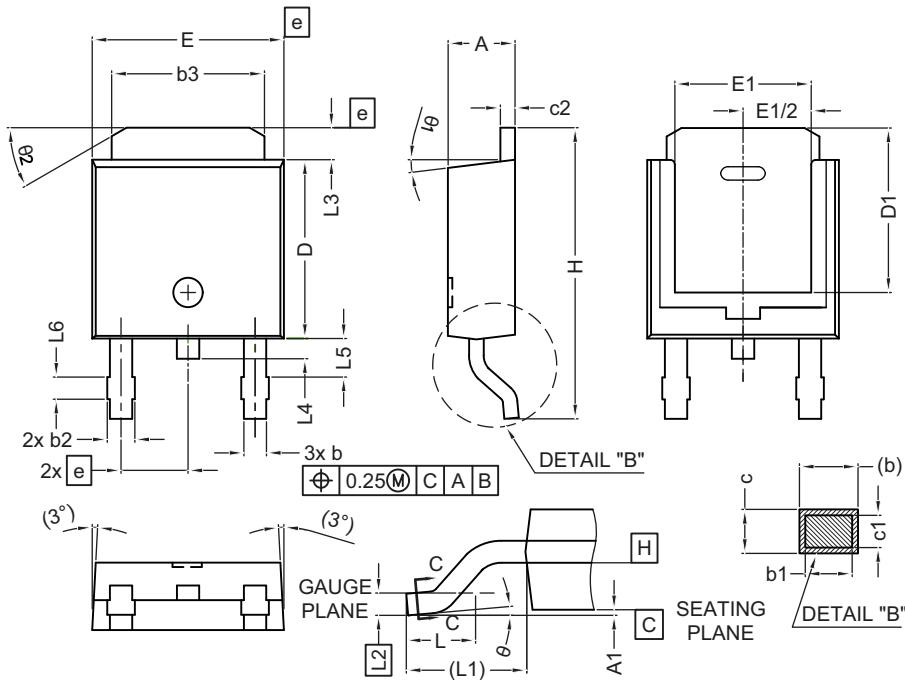


MILLIMETERS		
DIM.	MIN.	MAX.
A	2.18	2.38
A1	-	0.127
b	0.64	0.88
b2	0.76	1.14
b3	4.95	5.46
C	0.46	0.61
C2	0.46	0.89
D	5.97	6.22
D1	4.10	-
E	6.35	6.73
E1	4.32	-
H	9.40	10.41
e	2.28 BSC	
e1	4.56 BSC	
L	1.40	1.78
L3	0.89	1.27
L4	-	1.02
L5	1.01	1.52

Note

- Dimension L3 is for reference only

VERSION 2: FACILITY CODE = N



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

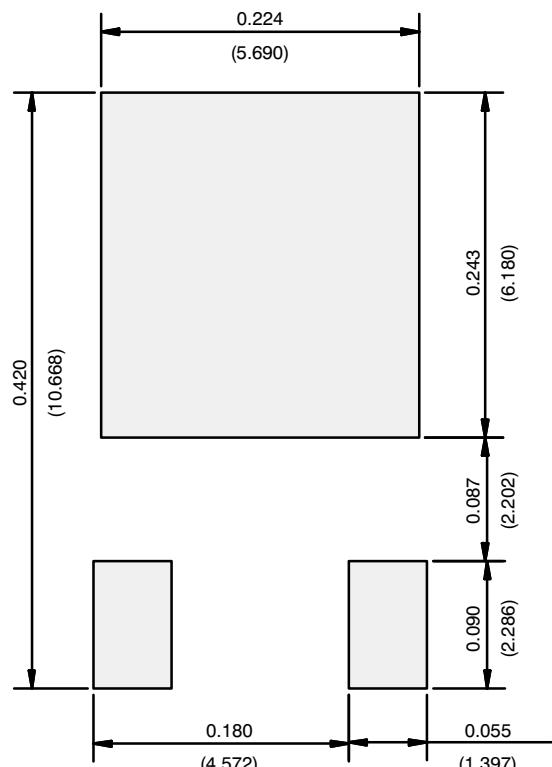
MILLIMETERS		
DIM.	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
θ	0°	10°
θ1	0°	15°
θ2	25°	35°

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)**

[Return to Index](#)

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