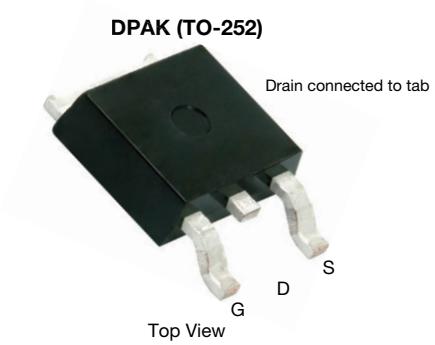
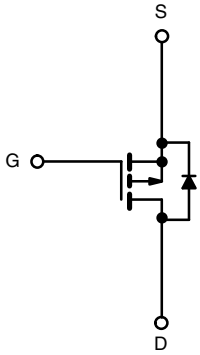
P-Channel 60 V (D-S), 175 °C MOSFET



FEATURES

- TrenchFET® power MOSFET
- 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)	-60
$R_{DS(on)}$ max. (Ω) at V_{GS} = -10 V	0.015
$R_{DS(on)}$ max. (Ω) at V_{GS} = -4.5 V	0.020
I_D (A) [d]	-50
Configuration	Single

ORDERING INFORMATION	
Package	DPAK (TO-252)
Lead (Pb)-free	SUD50P06-15L-E3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	-60	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current (T_J = 175 °C)	T_C = 25 °C	I_D	-50 [d]	A
	T_C = 125 °C		-39	
Pulsed drain current		I_{DM}	-80	
Avalanche current		I_{AR}	-50	
Repetitive avalanche energy [a]	L = 0.1 mH	E_{AR}	125	mJ
Power dissipation	T_C = 25 °C	P_D	136 [c]	W
	T_A = 25 °C		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 ≤ 10 s	R_{thJA}	15	18	°C/W
	Steady state		40	50	
Junction-to-case		R_{thJC}	0.82	1.1	

Notes

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

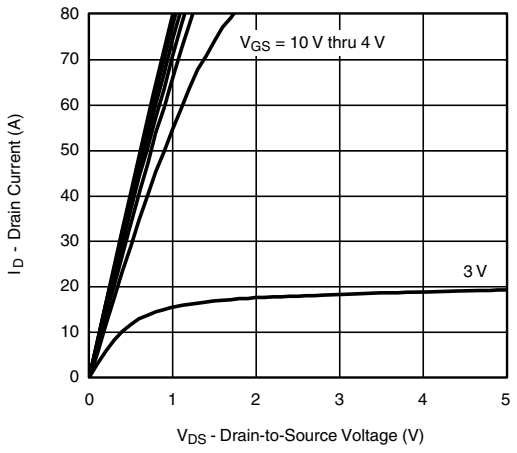
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = -250 µA	-60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250 µA	-1	-	-3	
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = -48 V, V_{GS} = 0 V	-	-	-1	µA
		V_{DS} = -48 V, V_{GS} = 0 V, T_J = 125 °C	-	-	-50	
		V_{DS} = -48 V, V_{GS} = 0 V, T_J = 175 °C	-	-	-150	
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 = -17 A	-	0.012	0.015	Ω
		V_{GS} = -10 V, I_D = -50 A, T_J = 125 °C	-	-	0.025	
		V_{GS} = -10 V, I_D = -50 A, T_J = 175 °C	-	-	0.030	
		V_{GS} = -4.5 V, I_D = -14 A	-	-	0.020	
Forward transconductance [a]	g_{fs}	V_{DS} = -15 V, I_D = -17 A	-	61	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	-	4950	-	pF
Output capacitance	C_{oss}		-	480	-	
Reverse transfer capacitance	C_{rss}		-	405	-	
Total gate charge [c]	Q_g	V_{DS} = -30 V, V_{GS} = -10 V, I_D = -50 A	-	110	165	nC
Gate-source charge [c]	Q_{gs}		-	19	-	
Gate-drain charge [c]	Q_{gd}		-	28	-	
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = -30 V, R_L = 0.6 Ω $I_D \cong$ -50 A, V_{GEN} = -10 V, R_G = 6 Ω	-	15	23	ns
Rise time [c]	t_r		-	70	105	
Turn-off delay time [c]	$t_{d(off)}$		-	175	260	
Fall time [c]	t_f		-	175	260	
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C) [b]						
Continuous current	I_S		-	-	-50	A
Pulsed current	I_{SM}		-	-	-80	
Forward voltage [a]	V_{SD}	I_F = -50 A, V_{GS} = 0 V	-	1	1.6	V
Reverse recovery time	t_{rr}	I_F = -50 A, di/dt = 100 A/µs	-	45	70	ns

Notes

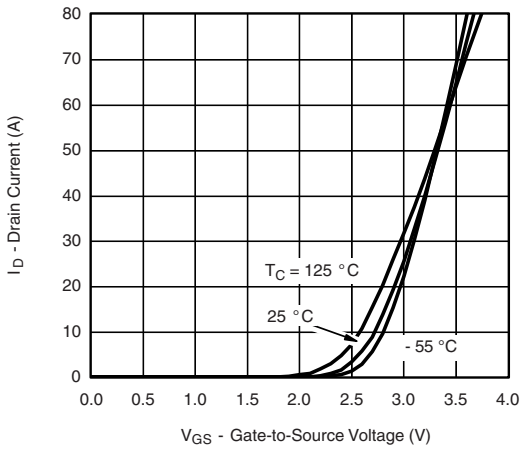
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

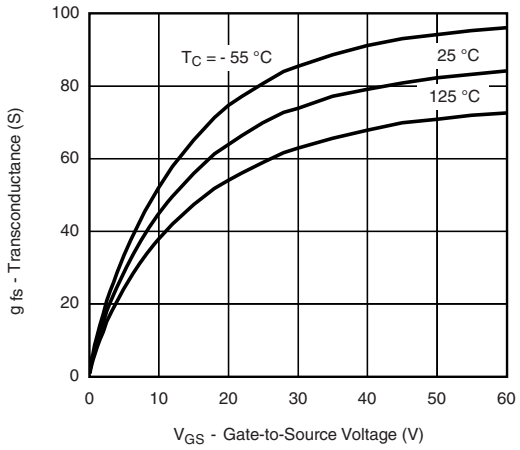
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



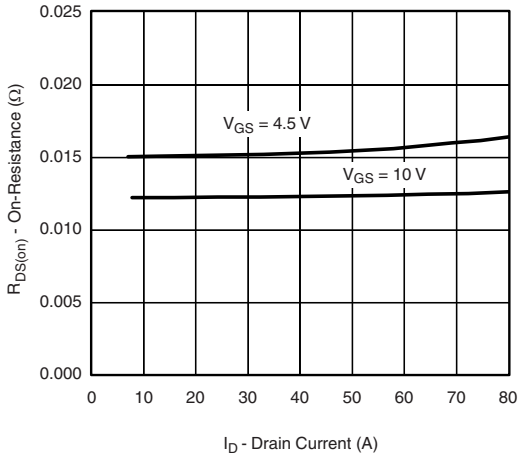
Output Characteristics



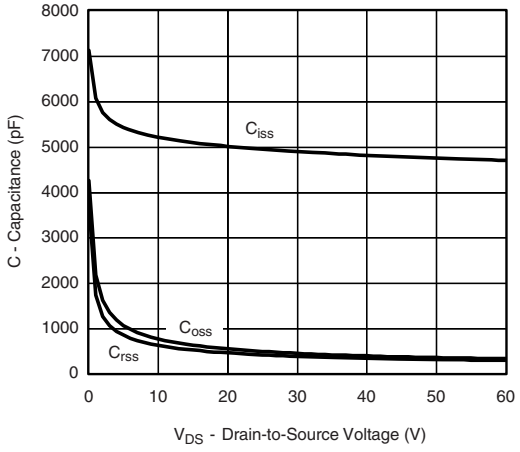
Transfer Characteristics



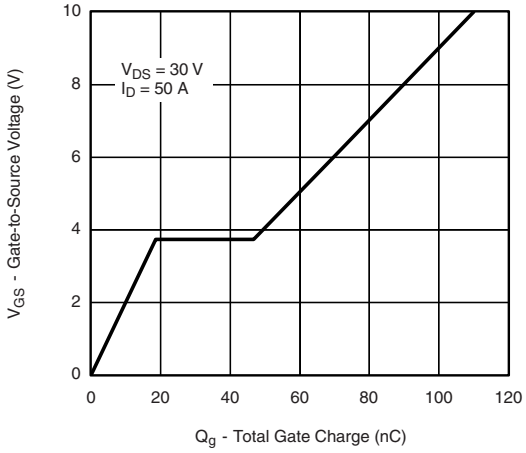
Transconductance



On-Resistance vs. Drain Current

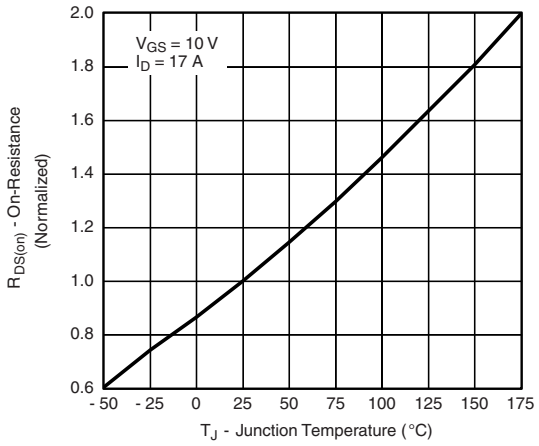


Capacitance

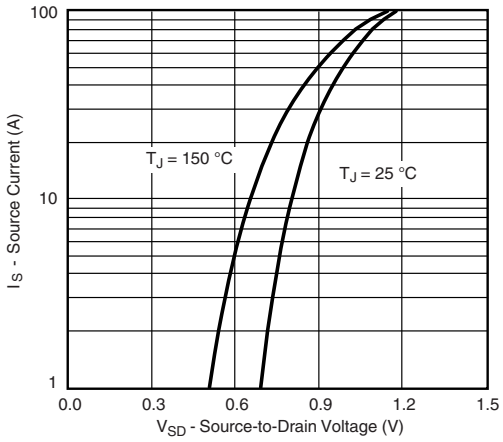


Gate Charge

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

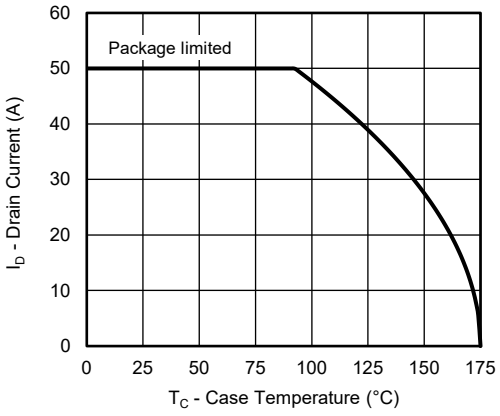


On-Resistance vs. Junction Temperature

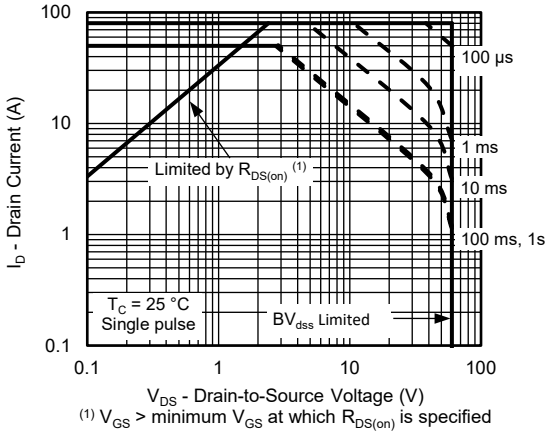


Source-Drain Diode Forward Voltage

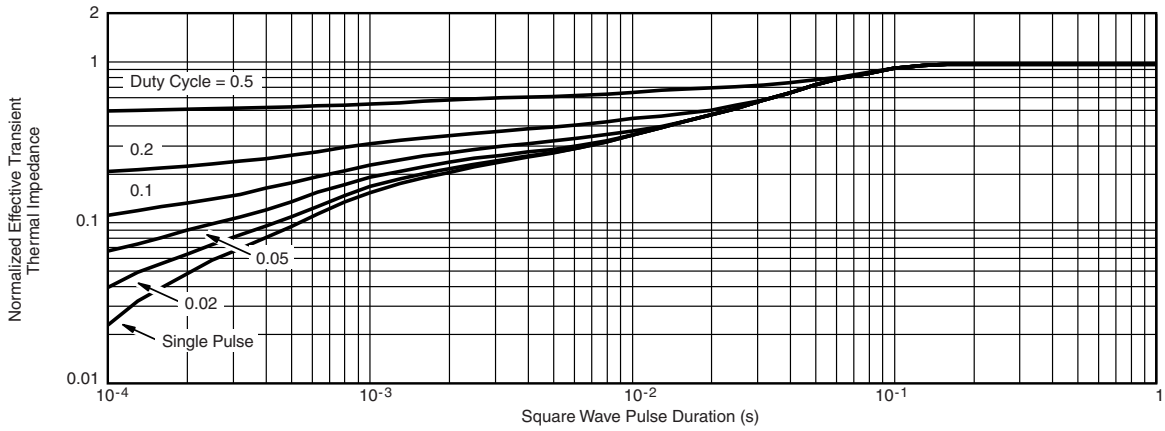
THERMAL RATINGS



Max. Avalanche and Drain Current vs. Case Temperature



Safe Operating Area

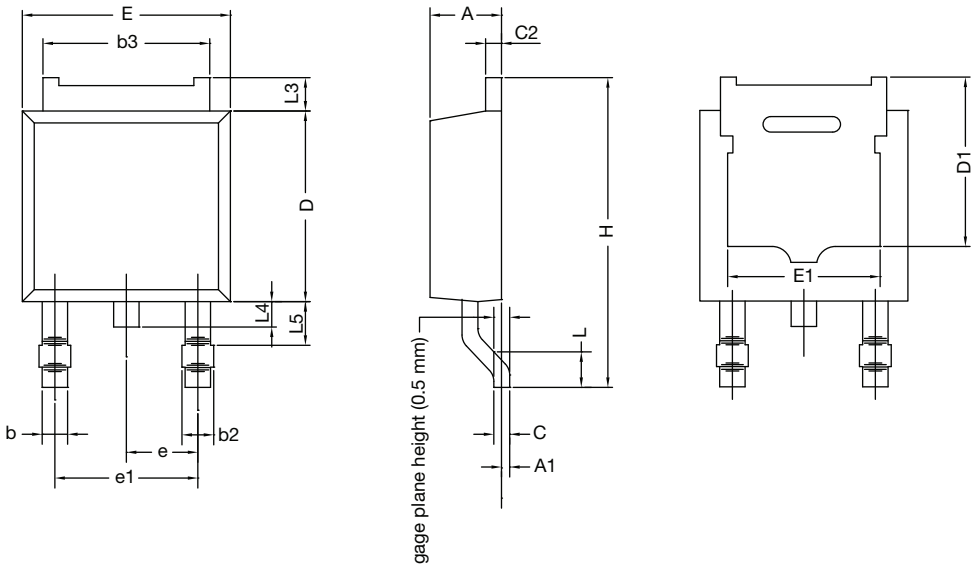


Normalized Thermal Transient Impedance, Junction-to-Case

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?72250.

TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y

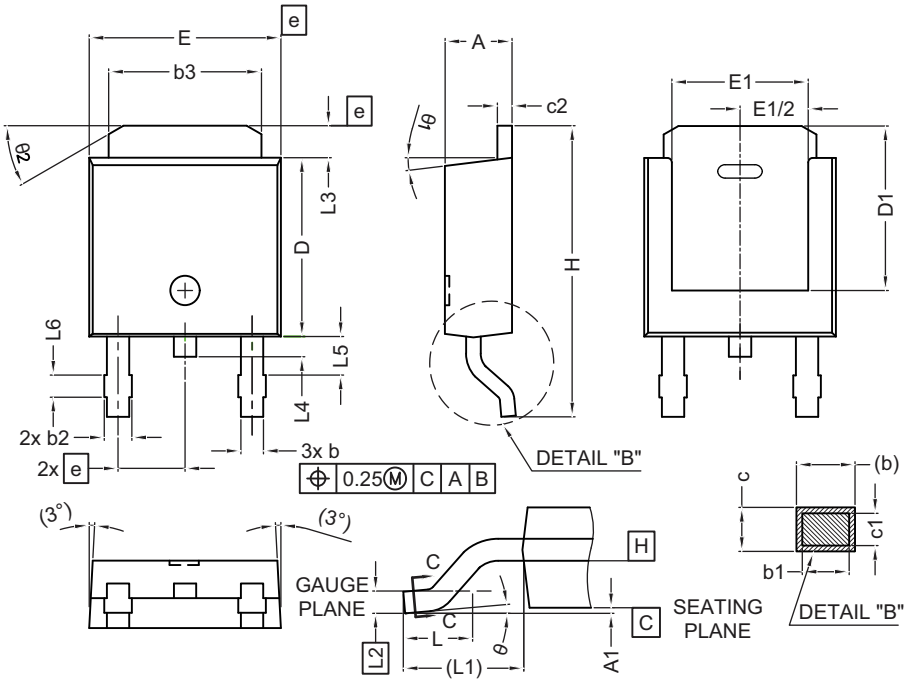


	MILLIMETERS	
DIM.	MIN.	MAX.
A	2.18	2.38
A1	-	0.127
b	0.64	0.88
b2	0.76	1.14
b3	4.95	5.46
C	0.46	0.61
C2	0.46	0.89
D	5.97	6.22
D1	4.10	-
E	6.35	6.73
E1	4.32	-
H	9.40	10.41
e	2.28 BSC	
e1	4.56 BSC	
L	1.40	1.78
L3	0.89	1.27
L4	-	1.02
L5	1.01	1.52

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

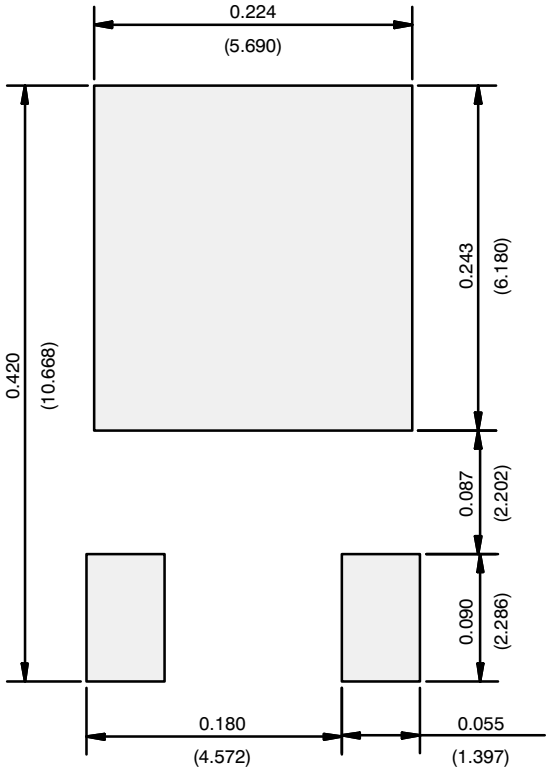
	MILLIMETERS	
DIM.	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
θ	0°	10°
θ1	0°	15°
θ2	25°	35°

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: 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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