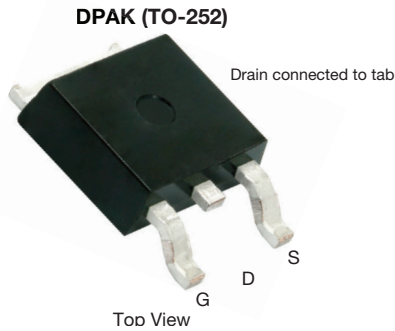
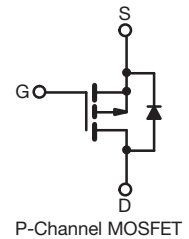


P-Channel 100 V (D-S) 175 °C MOSFET



FEATURES

- TrenchFET® Power MOSFET
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912


RoHS
COMPLIANT


PRODUCT SUMMARY	
V_{DS} (V)	-100
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -10$ V	0.043
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -4.5$ V	0.048
Q_g typ. (nC)	54
I_D (A) ^a	-37
Configuration	Single

ORDERING INFORMATION

Package	DPAK (TO-252)
Lead (Pb)-free and halogen-free	SUD50P10-43L-T1-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V_{DS}	-100	V	
Gate-source voltage	V_{GS}	± 20		
Continuous drain current ($T_J = 175$ °C) ^b	I_D	$T_C = 25$ °C	-37.1 ^a	
		$T_C = 125$ °C	-31 ^a	
		$T_A = 25$ °C	-9.2 ^{b, c}	
		$T_A = 125$ °C	-7.7 ^{b, c}	
Pulsed drain current	I_{DM}	-40	A	
Continuous source current (diode conduction)	I_S	$T_C = 25$ °C		-50 ^a
		$T_A = 25$ °C		-6.9 ^{b, c}
Avalanche current	I_{AS}	-35		mJ
Single pulse avalanche energy	E_{AS}	61		
Maximum power dissipation	P_D	$T_C = 25$ °C	136	
		$T_C = 70$ °C	95	
		$T_A = 25$ °C	8.3 ^{b, c}	
		$T_A = 70$ °C	5.8 ^{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 ^a	R_{thJA}	$t \leq 10$ s	15	18
		Steady state	40	50
Junction-to-case (drain)	R_{thJC}	0.85	1.1	°C/W

Note

- Package limited
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- Maximum under steady state conditions is 40 °C/W



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	-100	-	-	V				
VDS temperature coefficient	ΔV _{DS} /T _J	I _D = -250 μA		-109	-	mV/°C				
VGS(th) temperature coefficient	ΔV _{GS(th)} /T _J			5.9	-					
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA	-1	-	-3	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} = -100 V, V _{GS} = 0 V	-	-	-1	μA				
		V _{DS} = -100 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	-40	-	-	A				
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = -10 V, I _D = -9.2 A	-	0.036	0.043	Ω				
		V _{GS} = -4.5 V, I _D = -7.7 A	-	0.040	0.048					
Forward transconductance ^a	g _{fs}	V _{DS} = -15 V, I _D = -9.2 A	-	38	-	S				
Dynamic ^b										
Input capacitance	C _{iss}	V _{DS} = -50 V, V _{GS} = 0 V, f = 1 MHz	-	4600	-	pF				
Output capacitance	C _{oss}		-	230	-					
Reverse transfer capacitance	C _{rss}		-	175	-					
Total gate charge	Q _g	V _{DS} = -50 V, V _{GS} = -10 V, I _D = -9.2 A	-	106	160	nC				
		V _{DS} = -50 V, V _{GS} = -4.5 V, I _D = -9.2 A	-	54	81					
			-	14	-					
Gate-source charge	Q _{gs}	f = 1 MHz	-	26	-	Ω				
Gate-drain charge	Q _{gd}		-	4	-					
Gate resistance	R _g		-	15	25					
Turn-on delay time	t _{d(on)}	V _{DD} = -50 V, R _L = 6.5 Ω I _D ≅ -7.7 A, V _{GEN} = -10 V, R _g = 1 Ω	-	20	30	ns				
Rise time	t _r		-	110	165					
Turn-off delay time	t _{d(off)}		-	100	150					
Fall time	t _f		-	42	65					
Turn-on delay time	t _{d(on)}	V _{DD} = -50 V, R _L = 6.5 Ω I _D ≅ -7.7 A, V _{GEN} = -4.5 V, R _g = 1 Ω	-	160	240	ns				
			Rise time	t _r	-		100	150		
					Turn-off delay time		t _{d(off)}	-	100	150
								Fall time	t _f	-
Drain-source body diode characteristics										
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	-50	A				
Pulse diode forward current ^a	I _{SM}		-	-	-40					
Body diode voltage	V _{SD}	I _S = -7.7 A	-	-0.8	-1.2	V				
Body diode reverse recovery time	t _{rr}	I _F = -7.7 A, di/dt = 100 A/μs, T _J = 25 °C	-	60	90	ns				
Body diode reverse recovery charge	Q _{rr}		-	150	225	nC				
Reverse recovery fall time	t _a		-	46	-	ns				
Reverse recovery rise time	t _b		-	14	-					

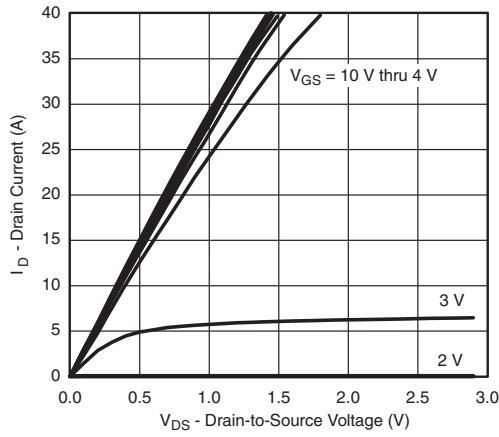
Notes

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

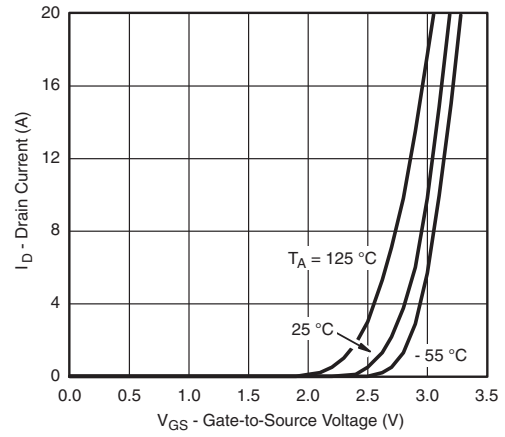
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



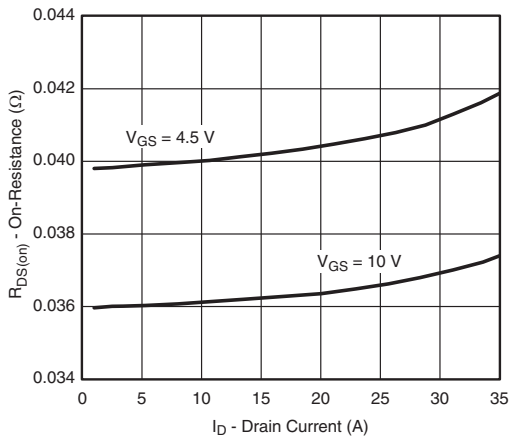
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



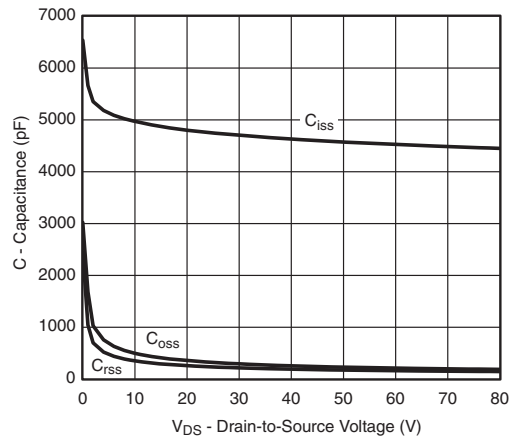
Output Characteristics



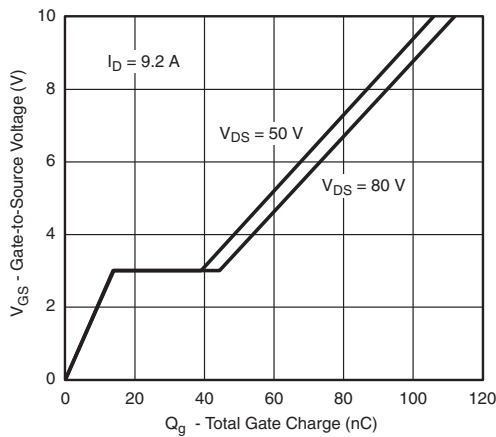
Transfer Characteristics



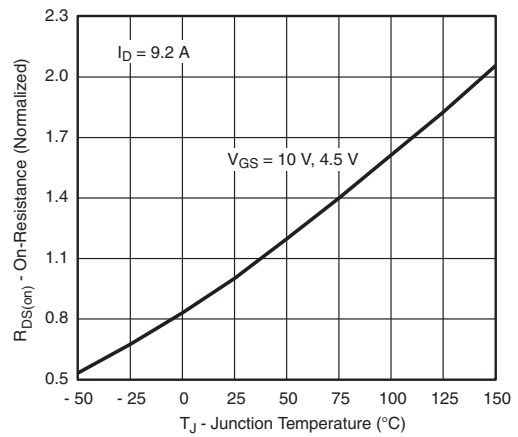
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



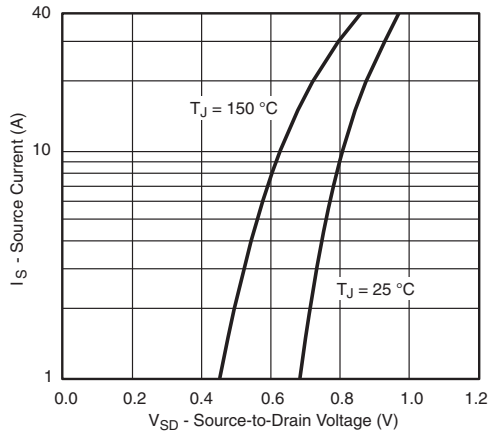
Gate Charge



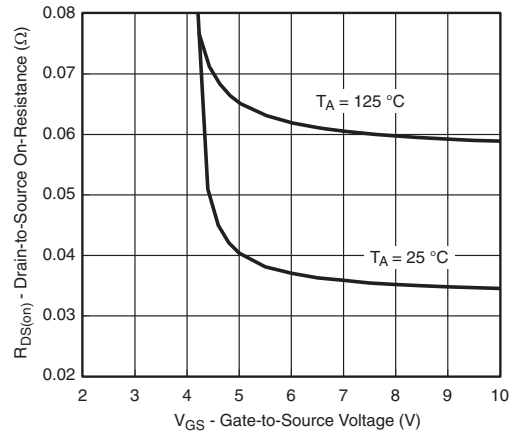
On-Resistance vs. Junction Temperature



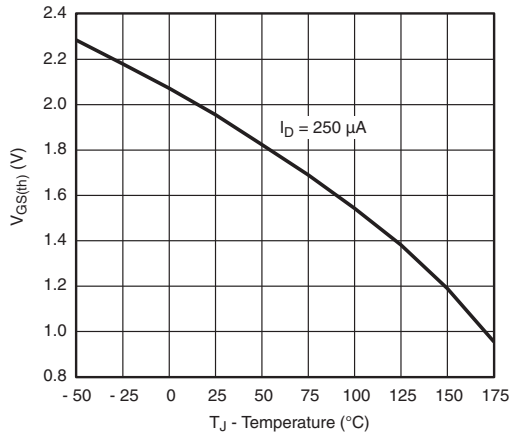
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



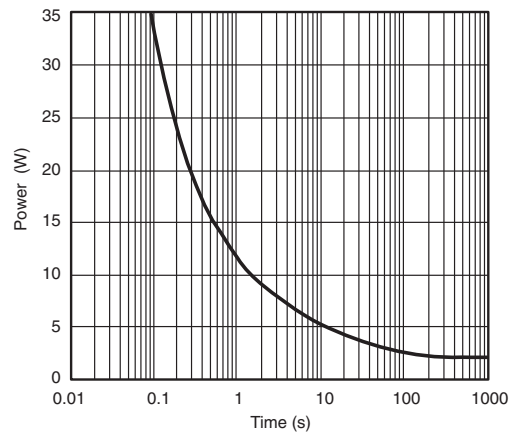
Source-Drain Diode Forward Voltage



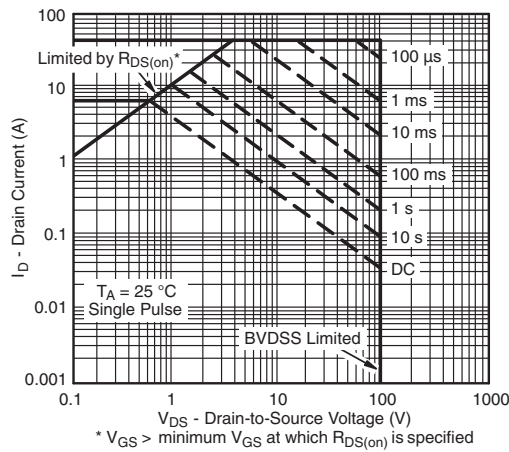
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



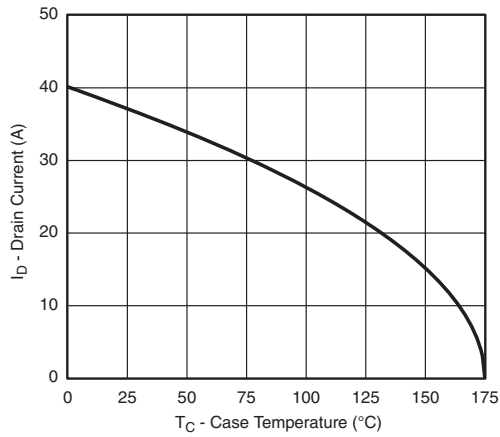
Single Pulse Power, Junction-to-Ambient



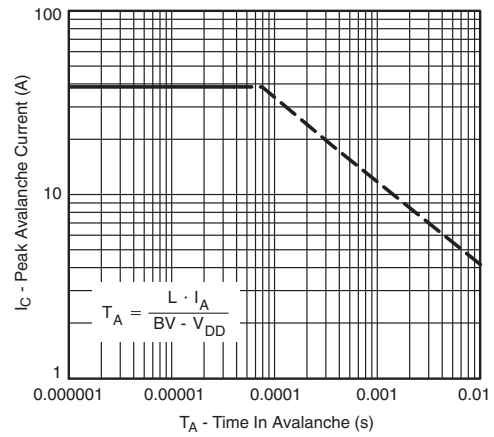
Safe Operating Area, Junction-to-Ambient



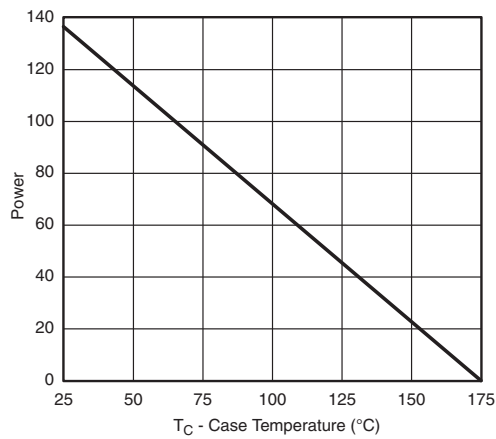
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Single Pulse Avalanche Capability



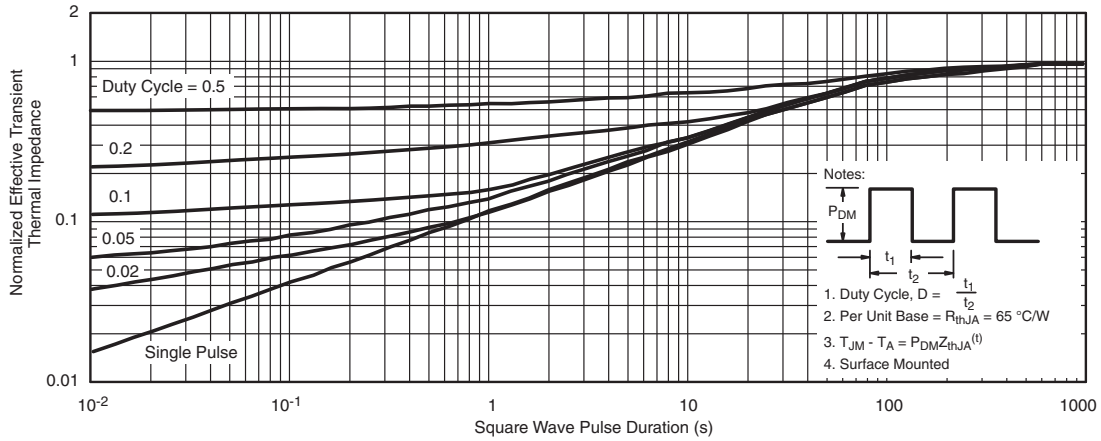
Single Pulse Power, Junction-to-Ambient

Note

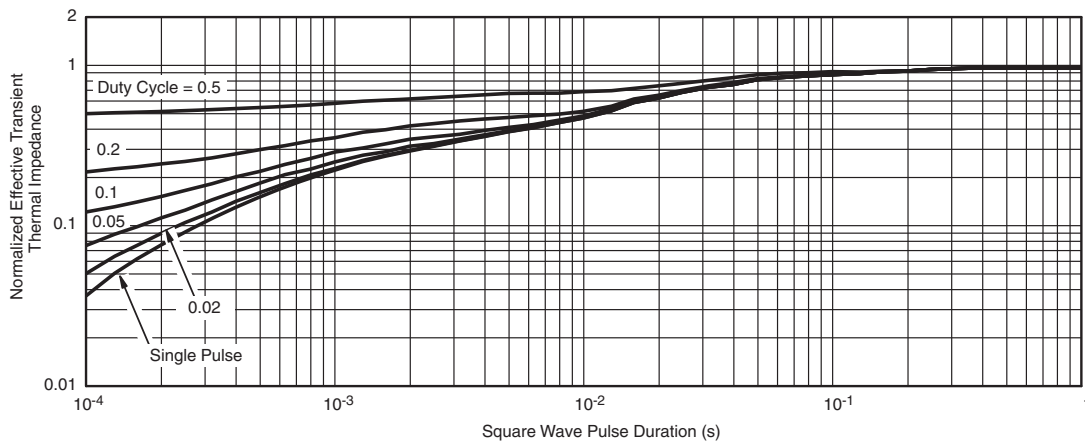
- a. The power dissipation P_D is based on $T_J \text{ max.} = 175 \text{ }^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating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



TYPICAL CHARACTERISTICS (25 °C, unless otherwise 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



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)

[Return to Index](#)



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