

P-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

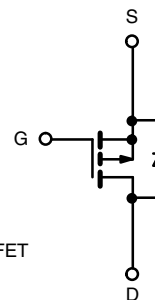
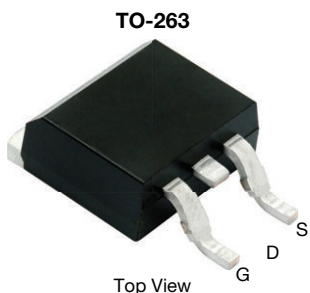
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d
-40	0.0042 at $V_{GS} = -10$ V	-110
	0.0062 at $V_{GS} = -4.5$ V	-110

FEATURES

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



RoHS
COMPLIANT



Ordering Information:

SUM110P04-04L-E3 (Lead (Pb)-free)

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C) ^d	I_D	$T_C = 25$ °C -110	A
		$T_C = 125$ °C -110	
Pulsed Drain Current	I_{DM}	-240	
Avalanche Current	I_{AS}	-75	
Single Pulse Avalanche Energy ^a	E_{AS}	281	mJ
Power Dissipation	P_D	$T_C = 25$ °C 375 ^c	W
		$T_A = 25$ °C ^b 3.75	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient PCB Mount ^b	R_{thJA}	40	°C/W
Junction-to-Case	R_{thJC}	0.4	

Notes

- Duty cycle ≤ 1 %.
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.
- Limited by package.



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	-40			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} = -40 V, V _{GS} = 0 V			-1	μA
		V _{DS} = -40 V, V _{GS} = 0 V, T _J = 125 °C			-50	
		V _{DS} = -40 V, V _{GS} = 0 V, T _J = 175 °C			-250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = -5 V, V _{GS} = -10 V	-120			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = -10 V, I _D = -30 A		0.0034	0.0042	Ω
		V _{GS} = -10 V, I _D = -30 A, T _J = 125 °C			0.0063	
		V _{GS} = -10 V, I _D = -30 A, T _J = 175 °C			0.0076	
		V _{GS} = -4.5 V, I _D = -20 A		0.005	0.0062	
Forward Transconductance ^a	g _{fs}	V _{DS} = -15 V, I _D = -30 A	20			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = -25 V, f = 1 MHz		11 200		pF
Output Capacitance	C _{oss}			1650		
Reverse Transfer Capacitance	C _{rss}			1200		
Total Gate Charge ^c	Q _g	V _{DS} = -20 V, V _{GS} = -10 V, I _D = -110 A		235	350	nC
Gate-Source Charge ^c	Q _{gs}			45		
Gate-Drain Charge ^c	Q _{gd}			65		
Gate Resistance	R _g			3		Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = -20 V, R _L = 0.18 Ω I _D ≐ -110 A, V _{GEN} = -10 V, R _g = 2.5 Ω		25	40	ns
Rise Time ^c	t _r			30	45	
Turn-Off Delay Time ^c	t _{d(off)}			190	300	
Fall Time ^c	t _f			110	165	
Source-Drain Diode Ratings and Characteristics (T _C = 25 °C) ^b						
Continuous Current	I _S				-110	A
Pulsed Current	I _{SM}				-240	
Forward Voltage ^a	V _{SD}	I _F = -85 A, V _{GS} = 0 V		-1	-1.5	V
Reverse Recovery Time	t _{rr}	I _F = -85 A, dI/dt = 100 A/μs		65	100	ns
Peak Reverse Recovery Current	I _{RM(REC)}			-3.7	-5.6	A
Reverse Recovery Charge	Q _{rr}				0.12	0.28

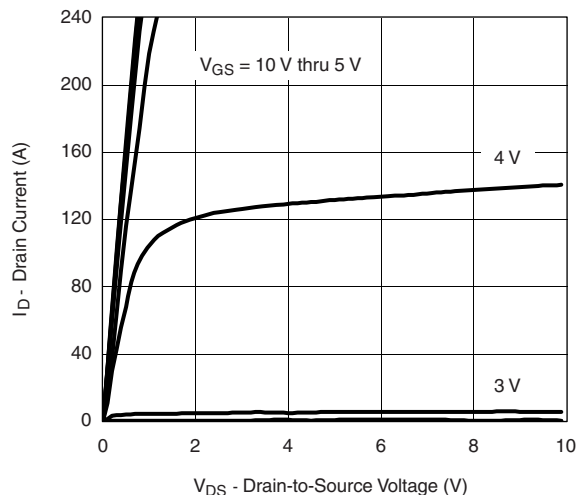
Notes

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

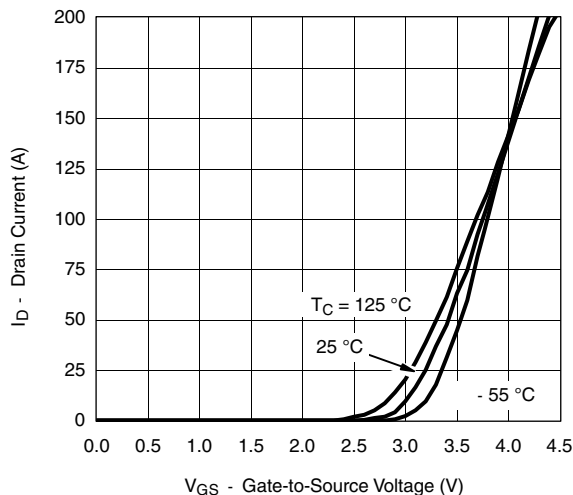
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



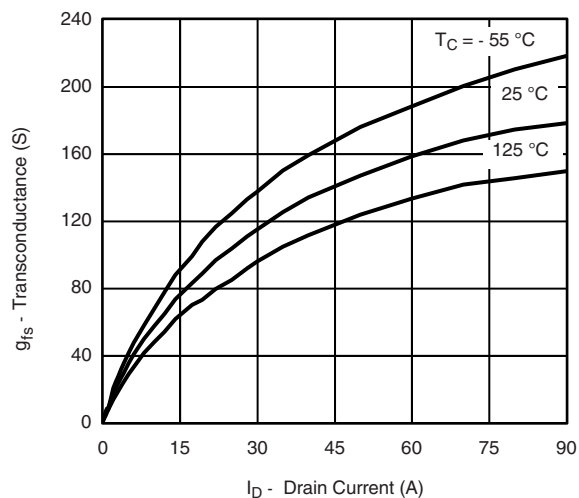
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



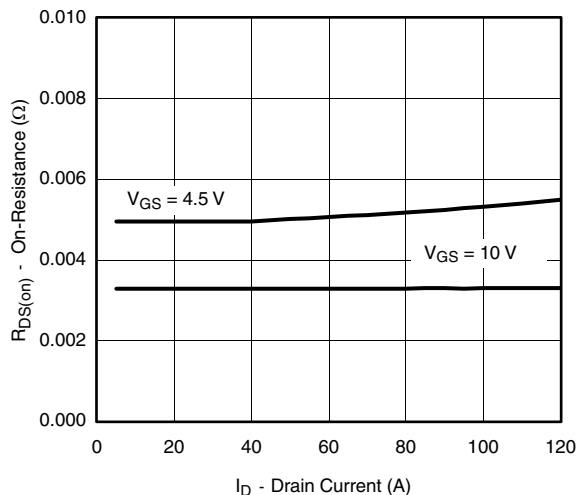
Output Characteristics



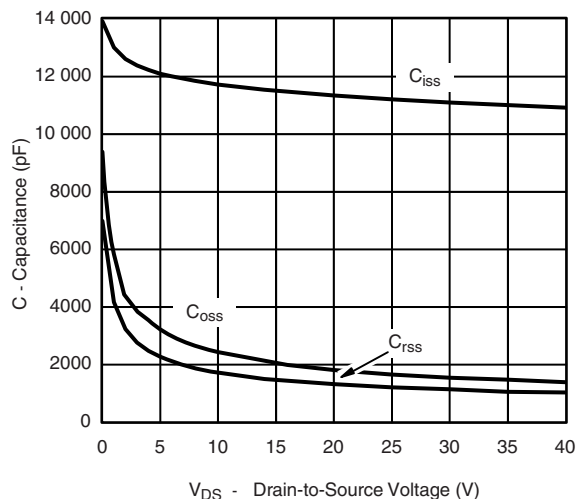
Transfer Characteristics



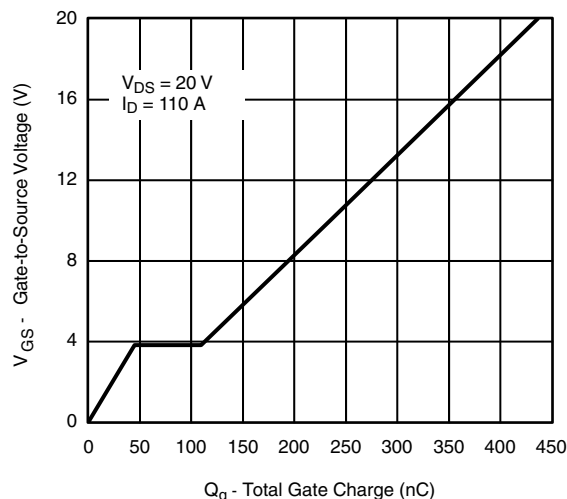
Transconductance



On-Resistance vs. Drain Current



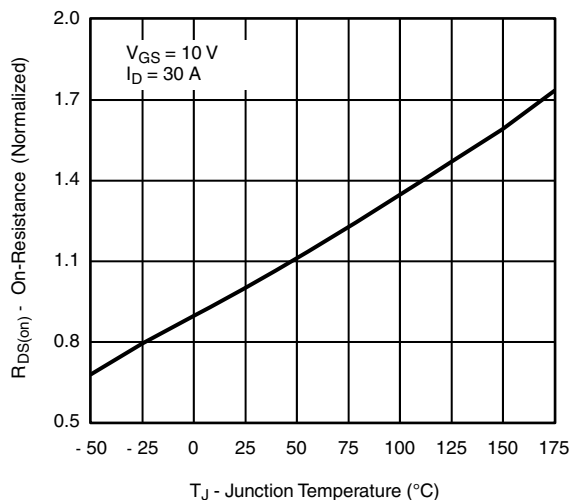
Capacitance



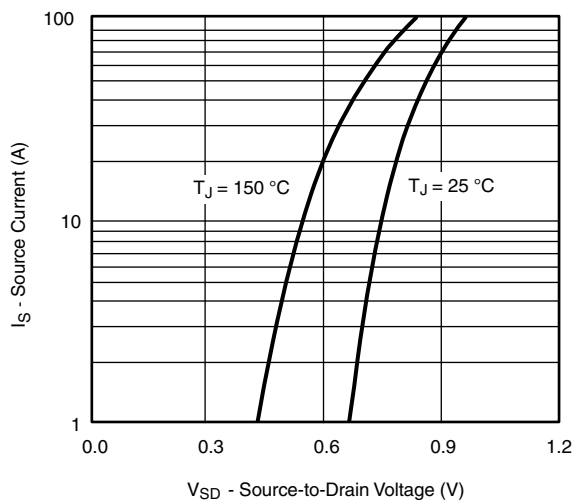
Gate Charge



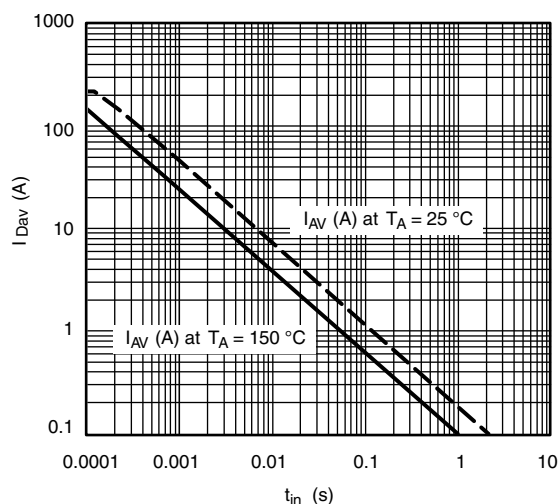
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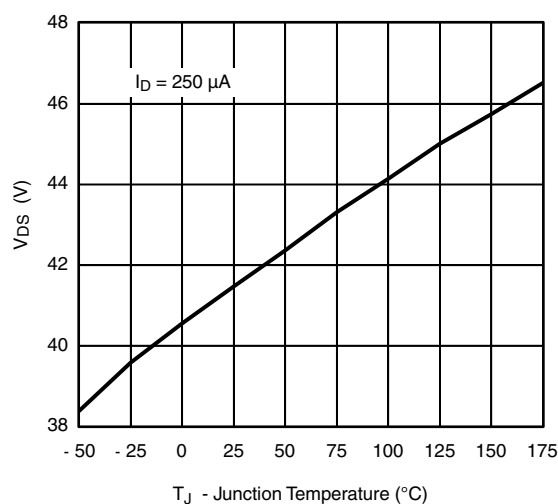
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



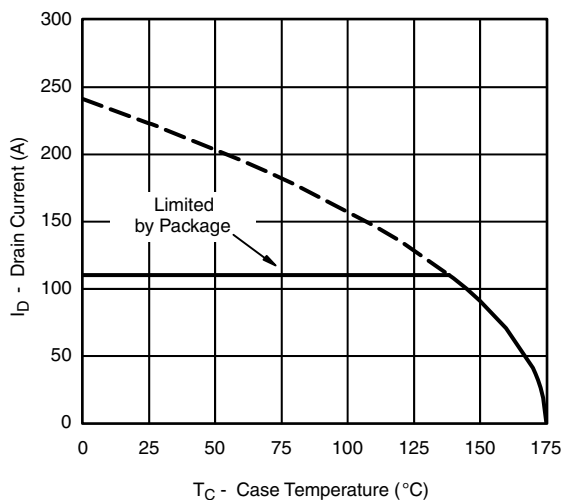
Avalanche Current vs. Time



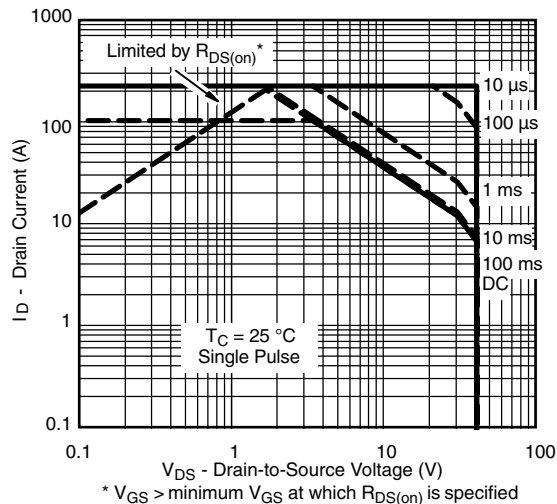
Drain Source Breakdown vs. Junction Temperature



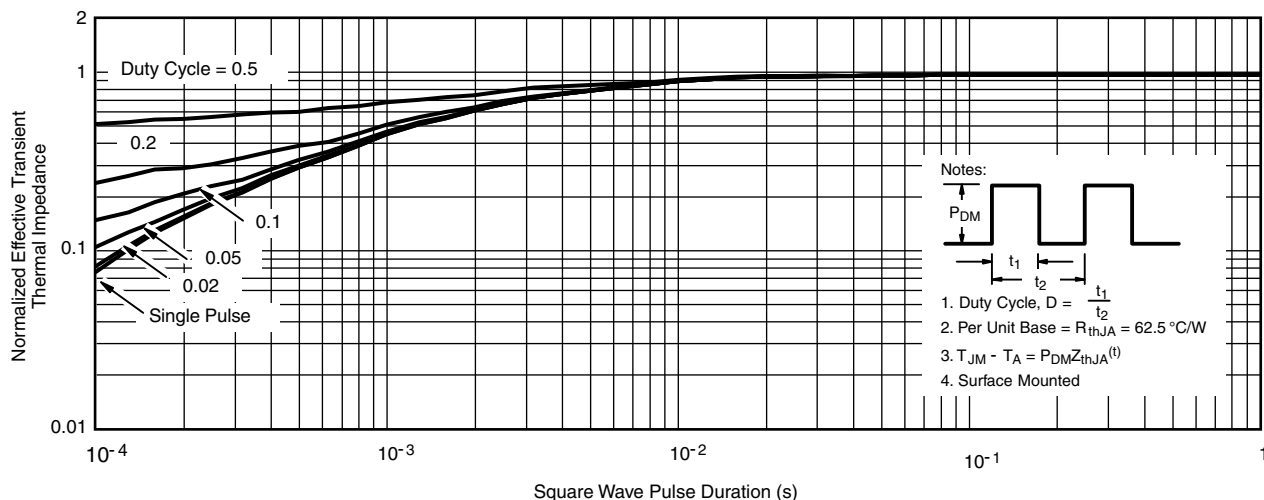
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature



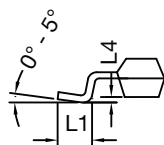
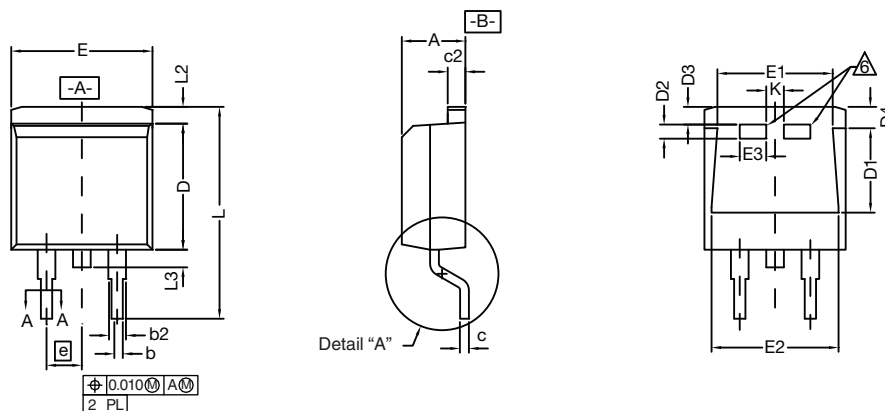
Safe Operating Area



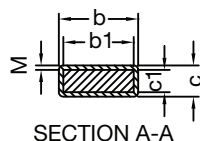
Normalized Thermal Transient Impedance, Junction-to-Case

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TO-263 (D²PAK): 3-LEAD



DETAIL A (ROTATED 90°)



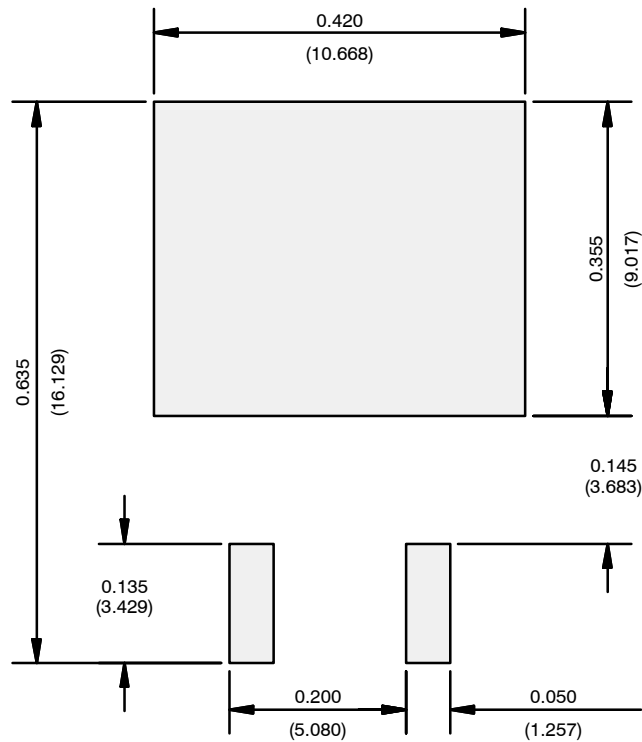
SECTION A-A

Notes

- Plane B includes maximum features of heat sink tab and plastic.
- No more than 25 % of L1 can fall above seating plane by max. 8 mils.
- Pin-to-pin coplanarity max. 4 mils.
- *: Thin lead is for SUB, SYB.
Thick lead is for SUM, SYM, SQM.
- Use inches as the primary measurement.
-  This feature is for thick lead.

DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
c2		0.045	0.055	1.143	1.397
D		0.340	0.380	8.636	9.652
D1		0.220	0.240	5.588	6.096
D2		0.038	0.042	0.965	1.067
D3		0.045	0.055	1.143	1.397
D4		0.044	0.052	1.118	1.321
E		0.380	0.410	9.652	10.414
E1		0.245	-	6.223	-
E2		0.355	0.375	9.017	9.525
		0.072	0.078	1.829	1.981
e		0.100 BSC		2.54 BSC	
K		0.045	0.055	1.143	1.397
L		0.575	0.625	14.605	15.875
L1		0.090	0.110	2.286	2.794
L2		0.040	0.055	1.016	1.397
L3		0.050	0.070	1.270	1.778
L4		0.010 BSC		0.254 BSC	
M		-	0.002	-	0.050
ECN: T13-0707-Rev. K, 30-Sep-13					
DWG: 5843					

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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