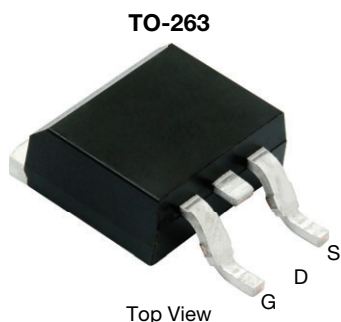




N-Channel 200 V (D-S) 175 °C MOSFET



Top View

FEATURES

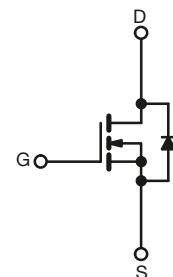
- ThunderFET® power MOSFET
- Low $R_{DS(on)}$ - Q_g figure-of-merit (FOM)
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Synchronous rectification
- Power supplies
- DC/AC inverter
- DC/DC converter
- Solar micro inverter
- Motor drive switch



N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	200
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0375
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 7.5$ V	0.0422
Q_g typ. (nC)	21
I_D (A)	35.1
Configuration	Single

ORDERING INFORMATION

Package	TO-263
Lead (Pb)-free and halogen-free	SUM90330E-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	200	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current	I_D	$T_C = 25$ °C	35.1
		$T_C = 125$ °C	20.3
Pulsed drain current ($t = 100$ μ s)	I_{DM}	70	A
Continuous source-drain diode current	I_S	12.5	A
Single pulse avalanche current ^a	I_{AS}	33	mJ
Single pulse avalanche energy ^a			
Maximum power dissipation	P_D	$T_C = 25$ °C	125 ^b
		$T_C = 125$ °C	41.7 ^b
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^c		260	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	MAXIMUM	UNIT
Maximum junction-to-ambient (PCB mount) ^c	R_{thJA}	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	1.2	

Notes

- Duty cycle ≤ 1 %
- See SOA curve for voltage derating
- When mounted on 1" square PCB (FR4 material)



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	200	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2	-	4	V
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	250	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V	-	-	1	μA
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 125 °C	-	-	150	
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 175 °C	-	-	5	mA
On-state drain current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	20	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 12.2 A	-	0.0312	0.0375	Ω
		V _{GS} = 7.5 V, I _D = 11.5 A	-	0.0337	0.0422	
Forward transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 10 A	-	28	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = 100 V, V _{GS} = 0 V, f = 1 MHz	-	1172	-	pF
Output capacitance	C _{oss}		-	150	-	
Reverse transfer capacitance	C _{rss}		-	11	-	
Total gate charge	Q _g	V _{DS} = 100 V, V _{GS} = 10 V, I _D = 12.2 A	-	21	32	nC
Gate-source charge	Q _{gs}		-	6	-	
Gate-drain charge	Q _{gd}		-	5.3	-	
Gate resistance	R _g	f = 1 MHz	0.76	3.8	7.6	Ω
Turn-on delay time	t _{d(on)}	V _{DD} = 100 V, R _L = 14.2 Ω, I _D ≅ 7 A, V _{GEN} = 10 V, R _g = 1 Ω	-	12	24	ns
Rise time	t _r		-	25	50	
Turn-off delay time	t _{d(off)}		-	30	50	
Fall time	t _f		-	22	44	
Drain-Source Body Diode Characteristics						
Pulse diode forward current (t = 100 μs)	I _{SM}		-	-	70	A
Body diode voltage	V _{SD}	I _F = 7 A, V _{GS} = 0 V	-	0.8	1.5	V
Body diode reverse recovery time	t _{rr}	I _F = 7 A, di/dt = 100 A/μs	-	111	170	ns
Body diode reverse recovery charge	Q _{rr}		-	0.51	1	μC
Reverse recovery fall time	t _a		-	94	-	ns
Reverse recovery rise time	t _b		-	17	-	
Body diode peak reverse recovery charge	I _{RM(REC)}		-	-	8.5	17

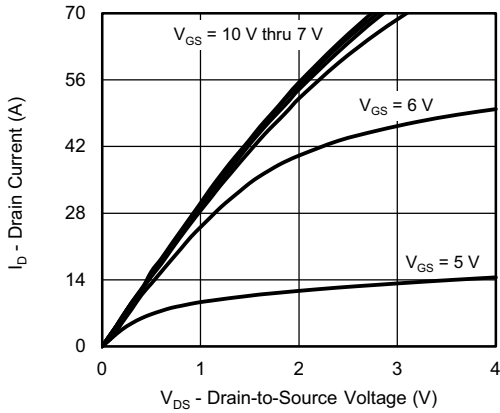
Notes

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

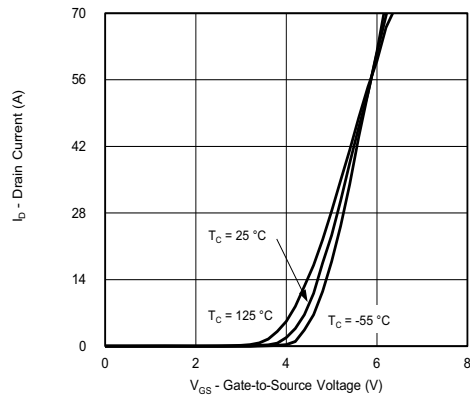
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



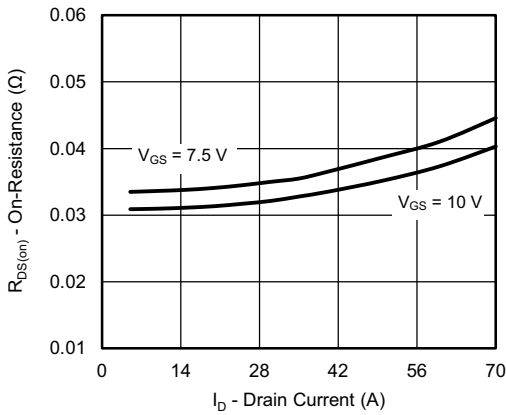
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



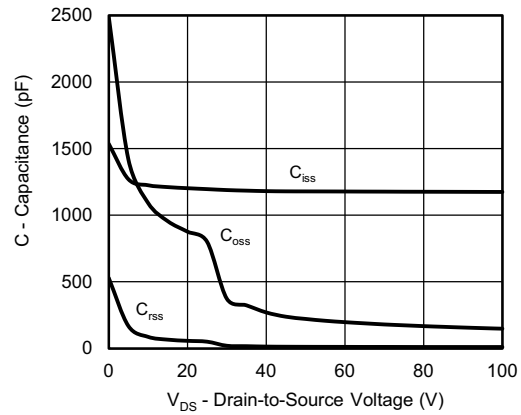
Output Characteristics



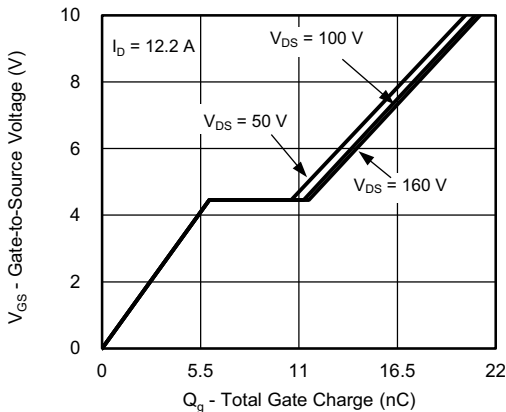
Transfer Characteristics



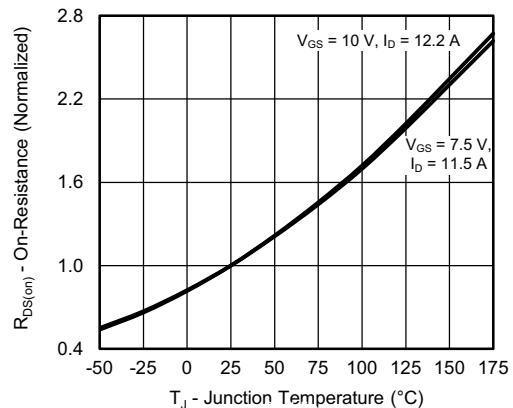
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



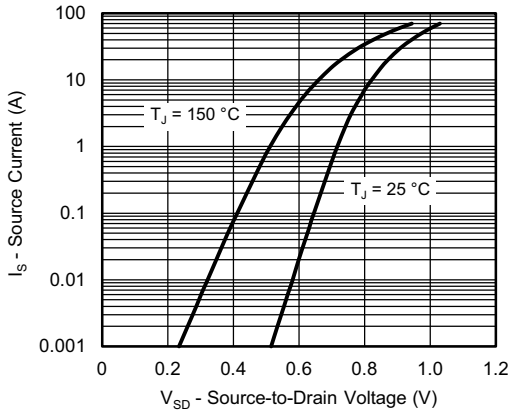
Gate Charge



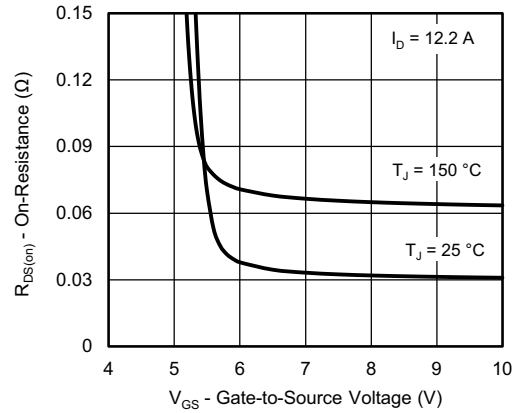
On-Resistance vs. Junction Temperature



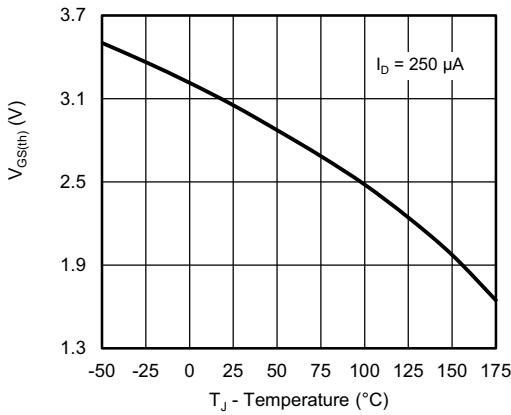
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



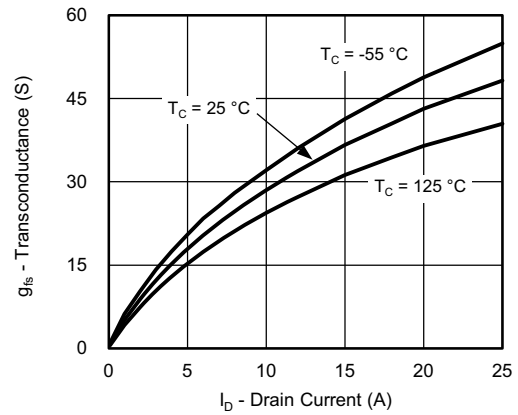
Source-Drain Diode Forward Voltage



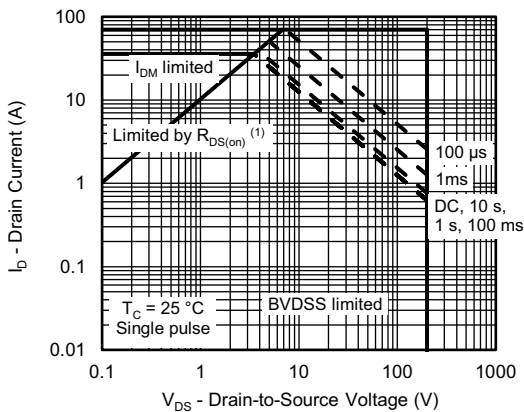
On-Resistance vs. Gate-to-Source Voltage



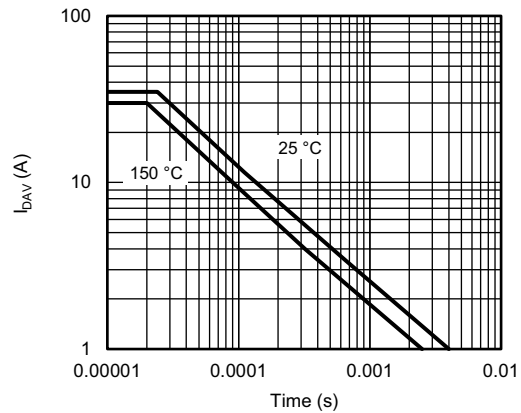
Threshold Voltage



Transconductance



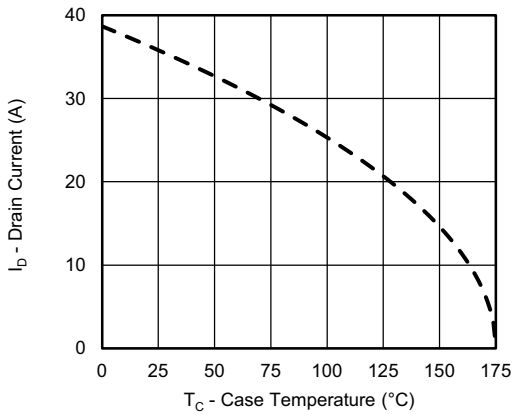
Safe Operating Area, Junction-to-Ambient



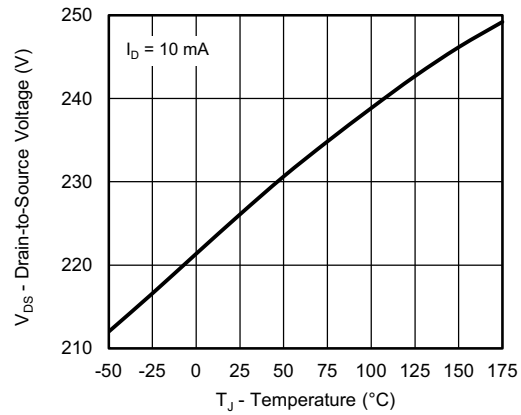
Avalanche vs. Time



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



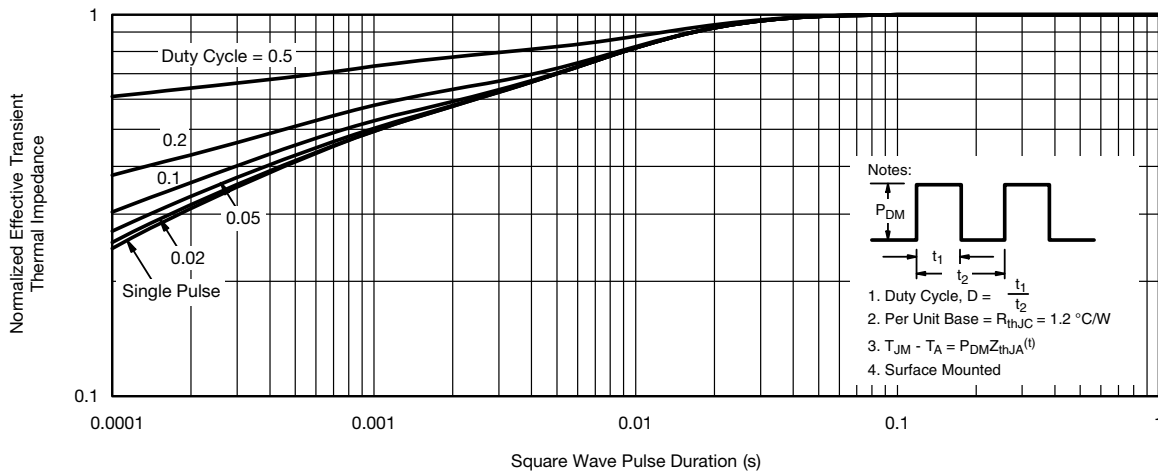
Current Derating ^a



Drain Source Breakdown vs. Junction Temperature

Note

a. The power dissipation P_D is based on T_J max. = 25 °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



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-263 (D²PAK): 3-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	
E3	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					

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.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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