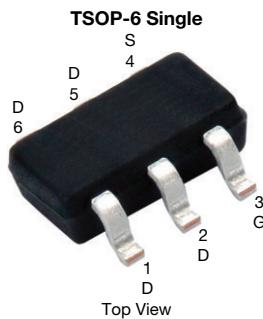


P-Channel 20 V (D-S) MOSFET


Marking code: BQ

PRODUCT SUMMARY	
V_{DS} (V)	-20
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -4.5$ V	0.0240
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -2.5$ V	0.0321
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -1.8$ V	0.0511
Q_g typ. (nC)	19.8
I_D (A) a, d	-8
Configuration	Single

ORDERING INFORMATION

Package	TSOP-6
Lead (Pb)-free and halogen-free	Si3493DDV-T1-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	-20	V
Gate-source voltage	V_{GS}	± 8	
Continuous drain current ($T_J = 150$ °C)	I_D	-8 a	
		-8	
		-7.5 b, c	
		-6 b, c	
Pulsed drain current ($t = 100$ μ s)	I_{DM}	-32	A
Continuous source-drain diode current	I_S	-3	
		-1.67 b, c	
Single pulse avalanche current	I_{AS}	-10	
Single pulse avalanche energy	E_{AS}	5	mJ
Maximum power dissipation	P_D	3.6	
		2.3	
		2 b, c	
		1.3 b, c	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient b	R_{thJA}	50	62.5	°C/W
Maximum junction-to-case (drain)	R_{thJC}	28	35	

Notes

- a. Package limited.
- b. Surface mounted on 1" x 1" FR4 board.
- c. $t = 5$ s.
- d. Maximum under steady state conditions is 110 °C/W.

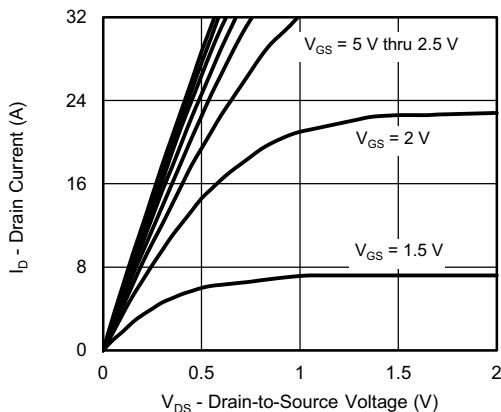
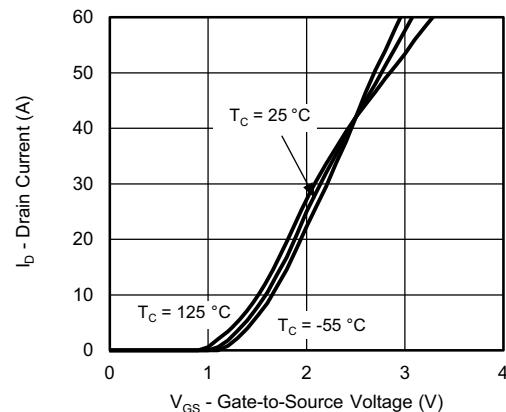
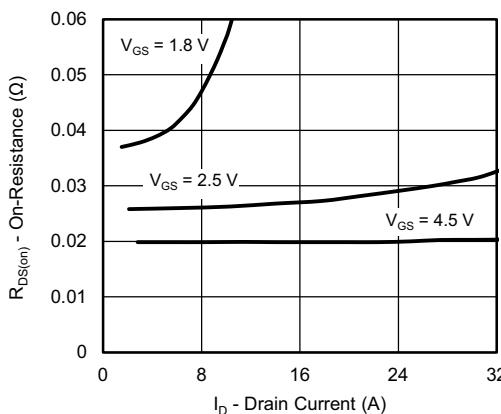
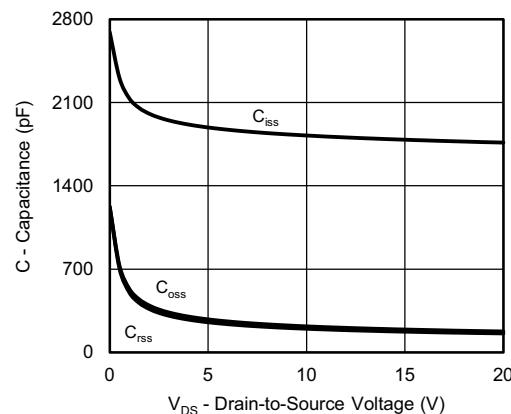
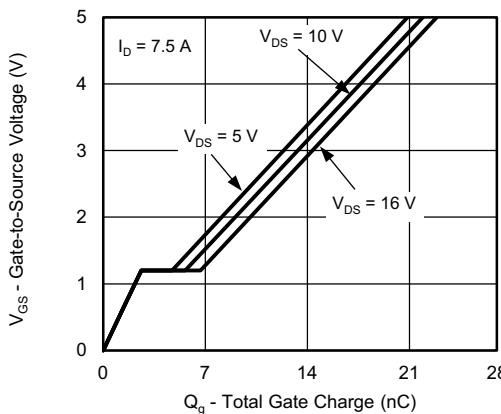
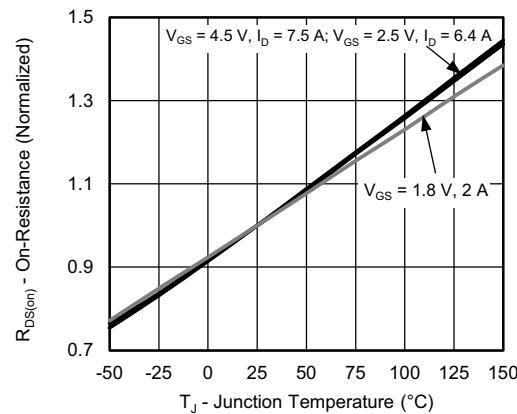


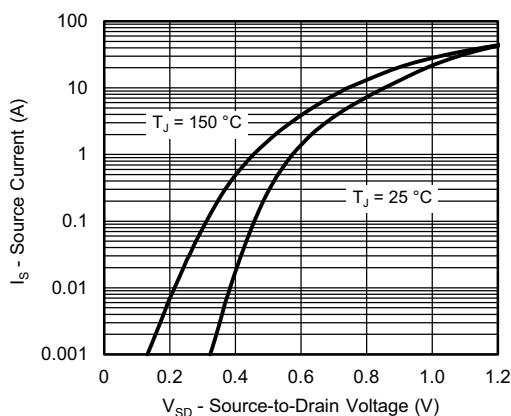
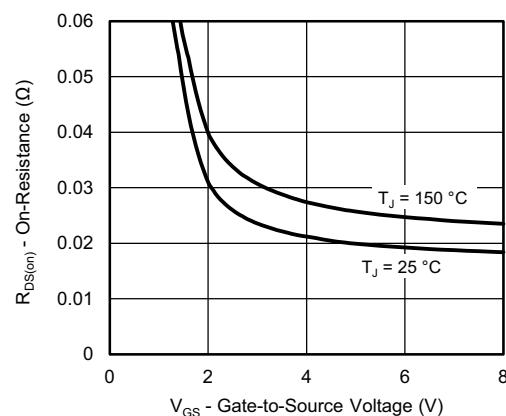
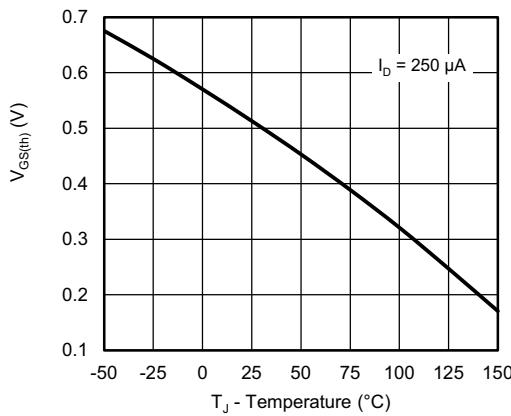
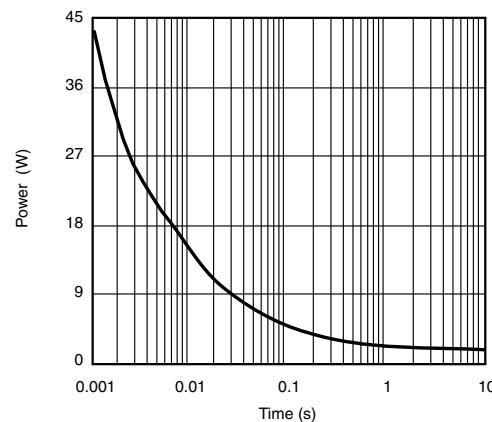
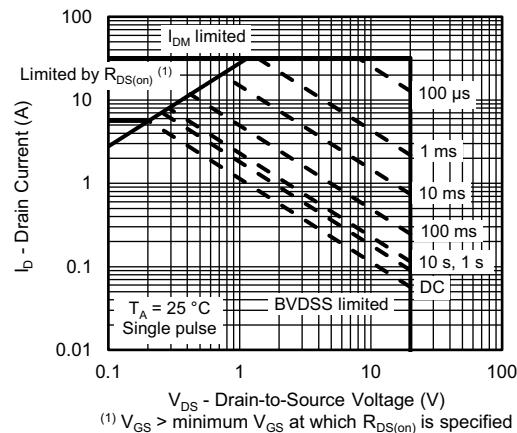
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	-20	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$	-	-12	-	$\text{mV}/^\circ\text{C}$
$V_{GS(\text{th})}$ temperature coefficient	$\Delta V_{GS(\text{th})}/T_J$		-	2.5	-	
Gate-source threshold voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-0.4	-	-1	V
Gate-source leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 8\text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -20\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	-1	μA
		$V_{DS} = -20\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 70^\circ\text{C}$	-	-	-10	
On-state drain current ^a	$I_{D(\text{on})}$	$V_{DS} \geq -10\text{ V}$, $V_{GS} = -4.5\text{ V}$	-20	-	-	A
Drain-source on-state resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = -4.5\text{ V}$, $I_D = -7.5\text{ A}$	-	0.0200	0.0240	Ω
		$V_{GS} = -2.5\text{ V}$, $I_D = -6.4\text{ A}$	-	0.0257	0.0321	
		$V_{GS} = -1.8\text{ V}$, $I_D = -2\text{ A}$	-	0.0378	0.0511	
Forward transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}$, $I_D = -7.5\text{ A}$	-	30	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	-	1825	-	pF
Output capacitance	C_{oss}		-	210	-	
Reverse transfer capacitance	C_{rss}		-	200	-	
Total gate charge	Q_g	$V_{DS} = -10\text{ V}$, $V_{GS} = -8\text{ V}$, $I_D = -7.5\text{ A}$	-	34.8	52.2	nC
Gate-source charge	Q_{gs}	$V_{DS} = -10\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -7.5\text{ A}$	-	19.8	30	
Gate-drain charge	Q_{gd}		-	2.6	-	
Gate resistance	R_g	$f = 1\text{ MHz}$	2.12	10.6	21.2	Ω
Turn-on delay time	$t_{d(\text{on})}$	$V_{DD} = -10\text{ V}$, $R_L = 1.67\text{ }\Omega$, $I_D \geq -6\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 1\text{ }\Omega$	-	25	38	ns
Rise time	t_r		-	30	45	
Turn-off delay time	$t_{d(\text{off})}$		-	95	145	
Fall time	t_f		-	40	60	
Turn-on delay time	$t_{d(\text{on})}$	$V_{DD} = -10\text{ V}$, $R_L = 1.67\text{ }\Omega$, $I_D \geq -6\text{ A}$, $V_{GEN} = -8\text{ V}$, $R_g = 1\text{ }\Omega$	-	8	16	ns
Rise time	t_r		-	20	30	
Turn-off delay time	$t_{d(\text{off})}$		-	115	173	
Fall time	t_f		-	40	60	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	$T_C = 25^\circ\text{C}$	-	-	-8	A
Pulse diode forward current	I_{SM}		-	-	-32	
Body diode voltage	V_{SD}	$I_S = -6\text{ A}$, $V_{GS} = 0\text{ V}$	-	-0.8	-1.2	V
Body diode reverse recovery time	t_{rr}	$I_F = -6\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25^\circ\text{C}$	-	21	32	ns
Body diode reverse recovery charge	Q_{rr}		-	9	18	
Reverse recovery fall time	t_a		-	9	-	ns
Reverse recovery rise time	t_b		-	12	-	

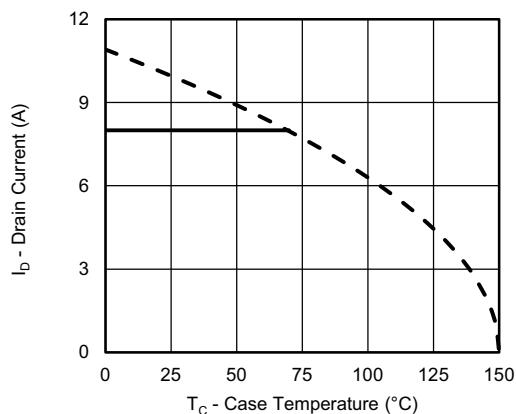
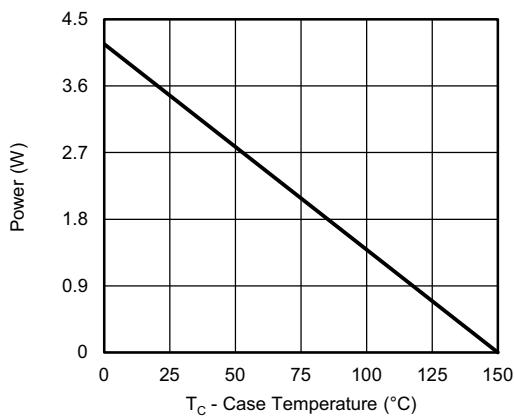
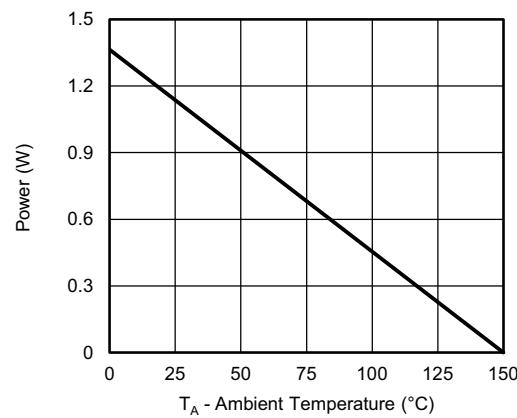
Notes

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

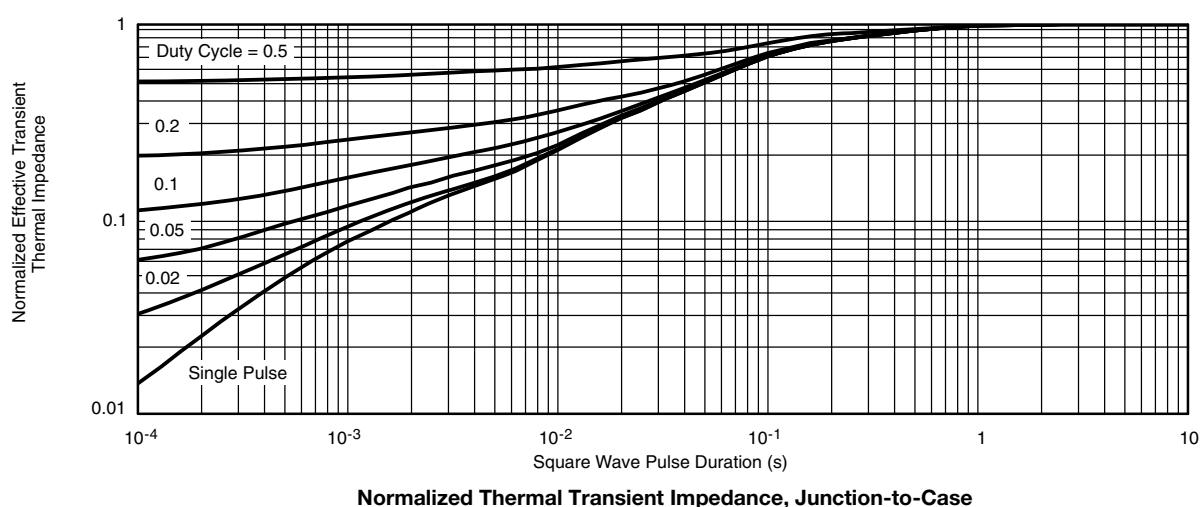
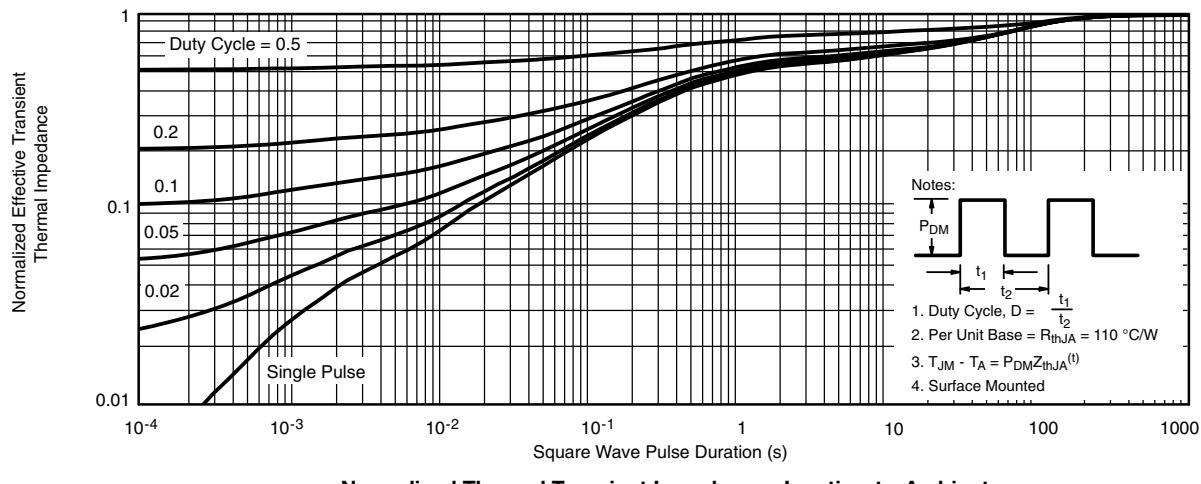
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

Power, Junction-to-Case

Power, Junction-to-Ambient
Note

a. The power dissipation P_D is based on T_J max. = 150 °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)


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