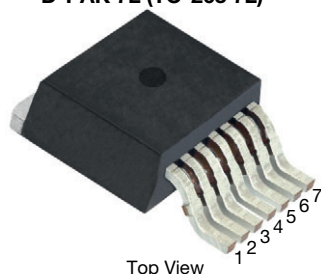
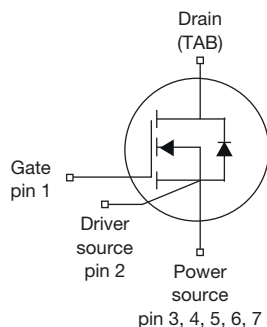


MaxSiC® 1200 V N-Channel SiC MOSFET

D²PAK 7L (TO-263 7L)


Top View


Marking Code: 120A063SE

FEATURES

- Fast switching speed
- Short circuit withstand time 3 μ s
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Solar inverters
- Energy storage systems
- UPS (uninterruptible power supplies)

PRODUCT SUMMARY

V_{DS} (V) at T_J max.	1200	
$R_{DS(on)}$ typ. (m Ω) at 25 °C	$V_{GS} = 18$ V	63
Q_g typ. (nC)	58	
I_D (A)	41	
C_{oss} typ. (pF)	69	
P_D (W)	221	
Configuration	Single	

ORDERING INFORMATION

Package	D ² PAK 7L (TO-263 7L)
Lead (Pb)-free and halogen-free	MXP120A063SE-T1GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	1200	V
Gate-source voltage	V_{GS}	-10 / +22	
Recommended operation voltage of gate-source	V_{GSOP}	-5 to -3 / +18	
Continuous drain current	I_D	41	A
Pulsed drain current ^a	I_{DM}	82	
Short-circuit withstand time ^b	T_{SC}	3	μ s
Maximum power dissipation	P_D	221	W
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature)	For 10 s	260	°C
Single pulse avalanche energy ^c	E_{AS}	162	mJ

Notes

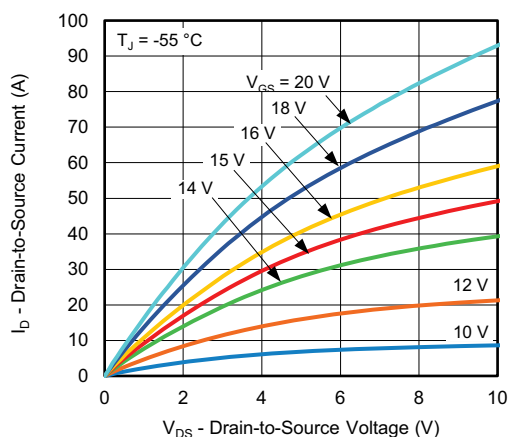
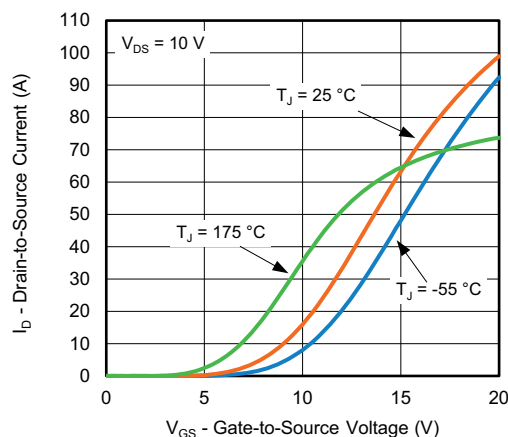
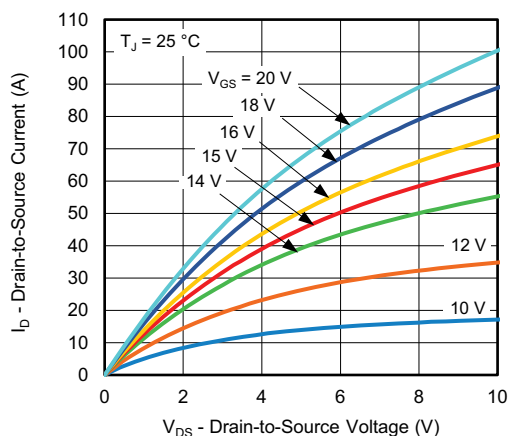
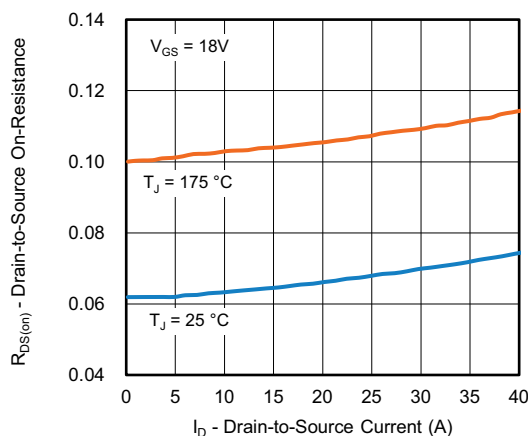
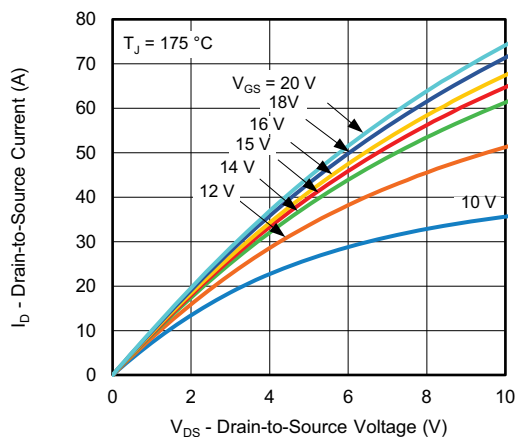
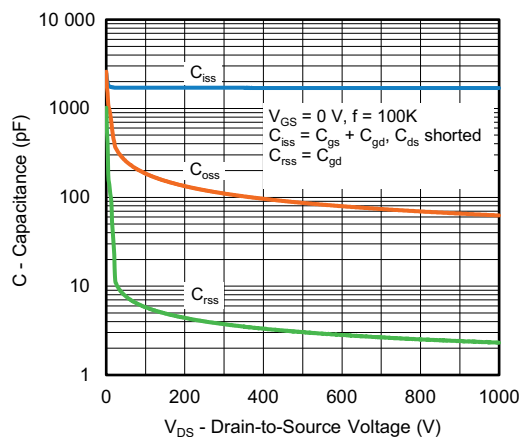
- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{GS} = 18$ V, $V_{DS} = 800$ V, $R_{g(ext)} = 20$ Ω , verified by the design / characterization
- $T_J = 25$ °C, $V_{DD} = 120$ V, $L = 1$ mH, $V_{GS} = 18$ V, $I_{AS} = 18$ A, verified by the design / characterization

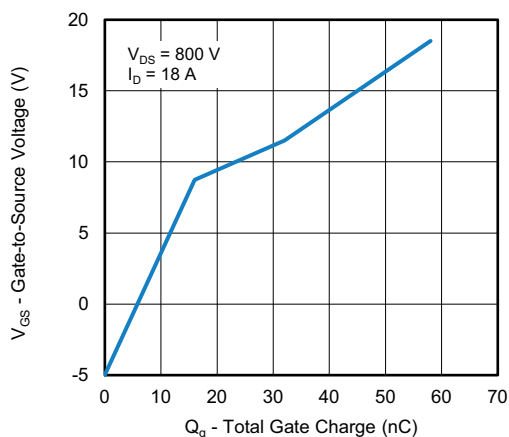
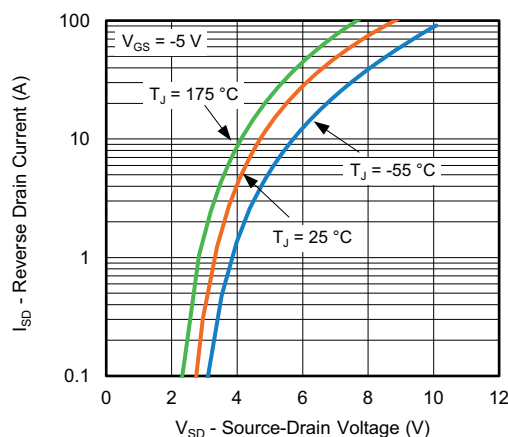
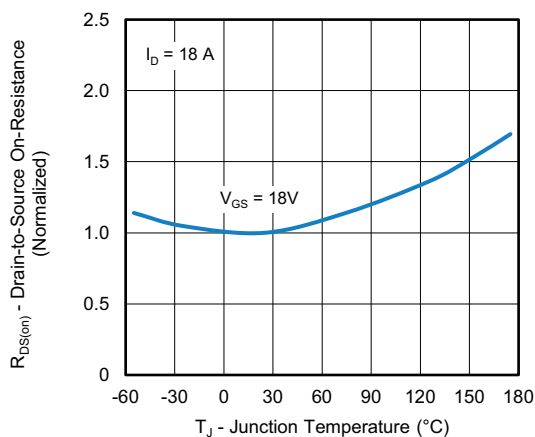
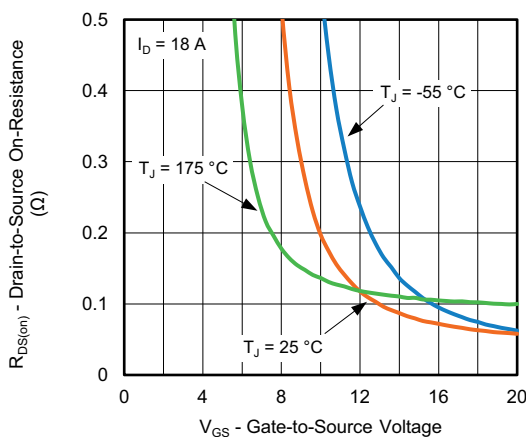
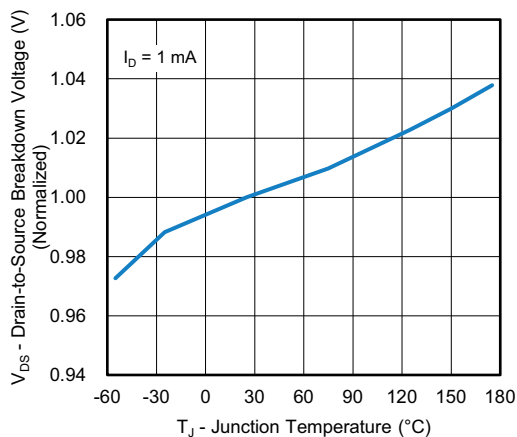
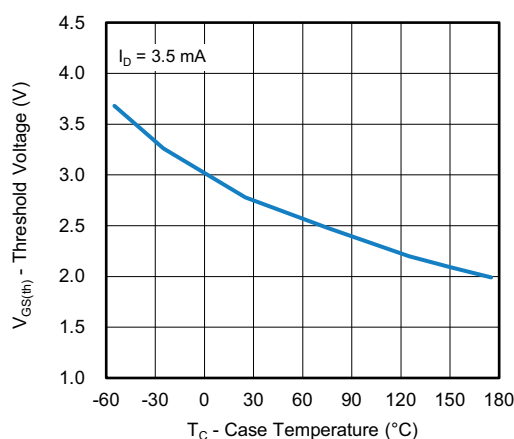
**THERMAL RESISTANCE RATINGS**

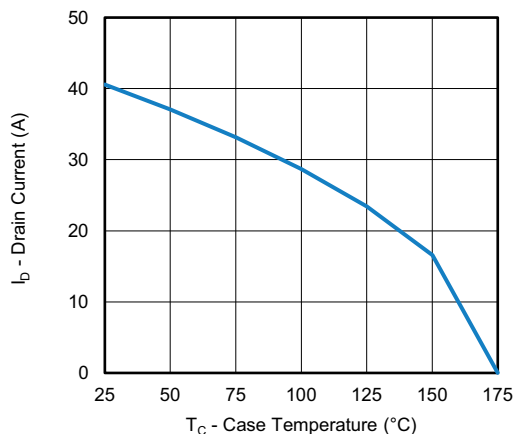
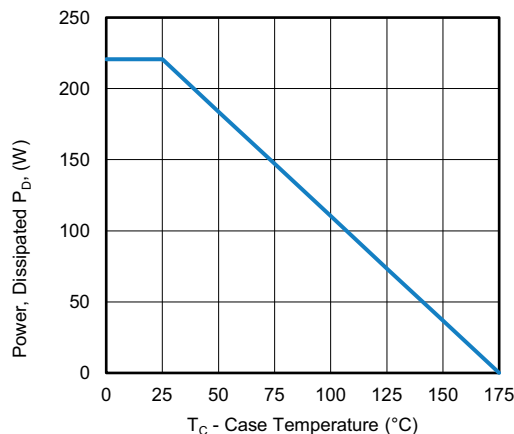
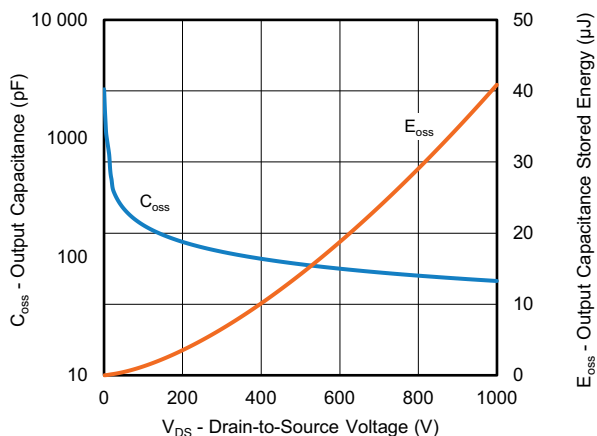
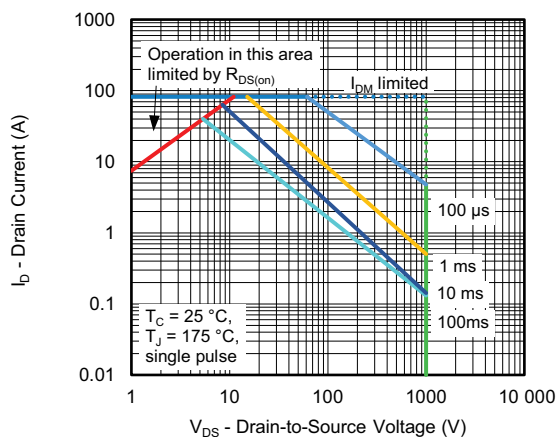
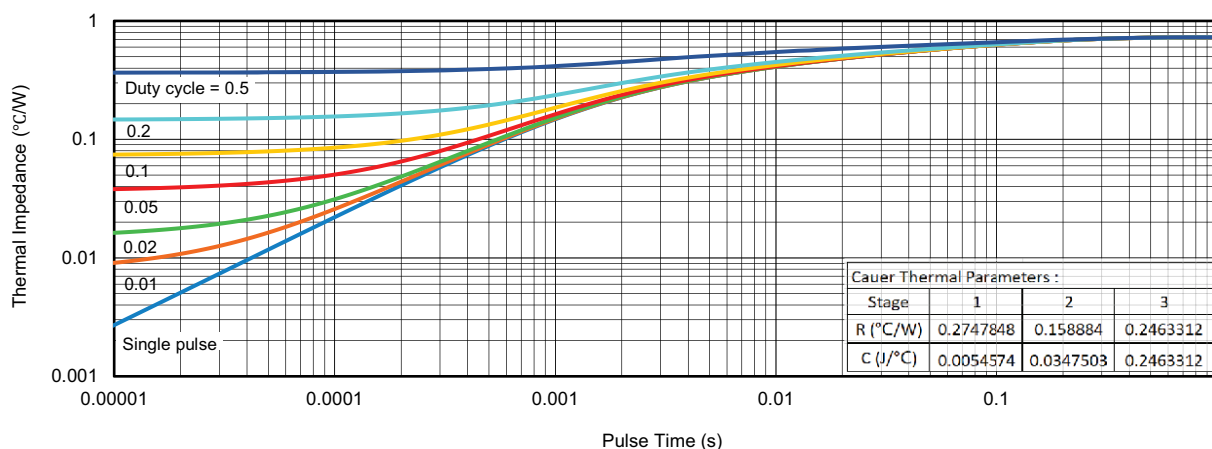
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	0.68	

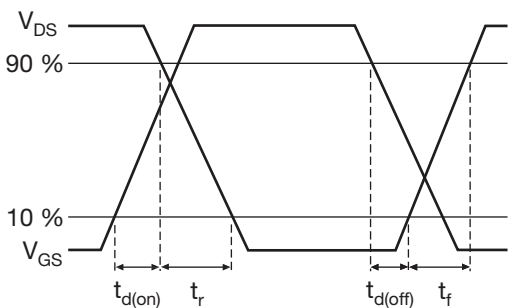
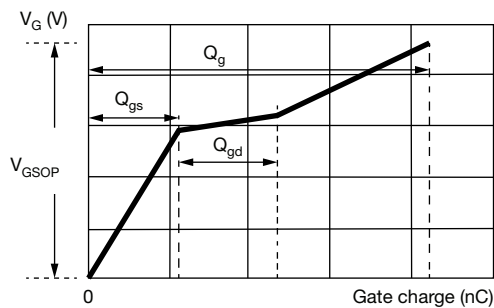
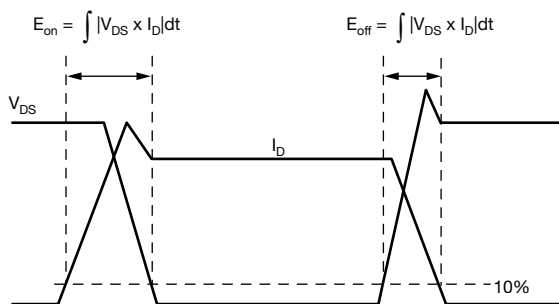
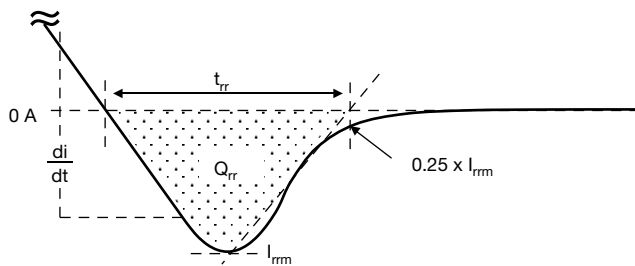
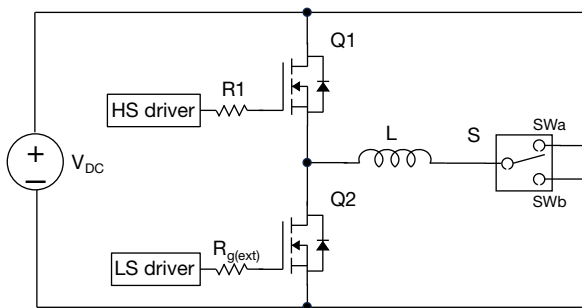
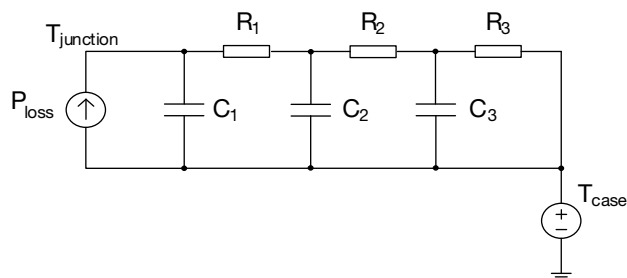
SPECIFICATIONS ($T_J = 25\text{ °C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	1200	-	-	V	
Gate-source threshold voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 3.5\text{ mA}$	-	2.9	-	V	
		$V_{DS} = V_{GS}$, $I_D = 3.5\text{ mA}$, $T_J = 175\text{ }^{\circ}\text{C}$	-	2.0	-	V	
Gate-source leakage	I_{GSS}	$V_{GS} = 22\text{ V}$, $V_{DS} = 0\text{ V}$	-	-	100	nA	
		$V_{GS} = -10\text{ V}$, $V_{DS} = 0\text{ V}$	-	-	-100		
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 1200\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	10	μA	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 15\text{ V}$, $I_D = 18\text{ A}$	-	75	94	m Ω	
		$V_{GS} = 18\text{ V}$, $I_D = 18\text{ A}$	-	63	79		
		$V_{GS} = 18\text{ V}$, $I_D = 18\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$	-	107	-		
Transconductance	g_{fs}	$V_{DS} = 10\text{ V}$, $I_D = 18\text{ A}$	-	8	-	S	
Dynamic							
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 800\text{ V}$, $f = 100\text{ KHz}$	-	1699	-	pF	
Output capacitance	C_{oss}		-	69	-		
Reverse transfer capacitance	C_{rss}		-	3	-		
Total gate charge	Q_g	$V_{GS} = -5\text{ V} \sim 18\text{ V}$, $I_D = 18\text{ A}$, $V_{DS} = 800\text{ V}$	-	58	-	nC	
Gate-source charge	Q_{gs}		-	16	-		
Gate-drain charge	Q_{gd}		-	16	-		
Gate Resistance	R_g	$V_{DS} = 0\text{ V}$, $f = 1\text{ MHz}$	-	3	-	Ω	
Switching Characteristics							
Turn-on delay time	$t_{d(on)}$	$V_{GS} = -5\text{ V} \sim 18\text{ V}$, $I_D = 18\text{ A}$, $V_{DS} = 800\text{ V}$, $R_{g(ext)} = 4.4\text{ }\Omega$	$T_J = 25\text{ }^{\circ}\text{C}$	-	18	-	ns
			$T_J = 175\text{ }^{\circ}\text{C}$	-	18	-	
Rise time	t_r		$T_J = 25\text{ }^{\circ}\text{C}$	-	9	-	
			$T_J = 175\text{ }^{\circ}\text{C}$	-	8	-	
Turn-off delay time	$t_{d(off)}$		$T_J = 25\text{ }^{\circ}\text{C}$	-	19	-	
			$T_J = 175\text{ }^{\circ}\text{C}$	-	20	-	
Fall time	t_f		$T_J = 25\text{ }^{\circ}\text{C}$	-	10	-	
			$T_J = 175\text{ }^{\circ}\text{C}$	-	10	-	
Turn-on switching energy	E_{on}		$T_J = 25\text{ }^{\circ}\text{C}$	-	191	-	μJ
			$T_J = 175\text{ }^{\circ}\text{C}$	-	178	-	
Turn-off switching energy	E_{off}	$T_J = 25\text{ }^{\circ}\text{C}$	-	51	-		
		$T_J = 175\text{ }^{\circ}\text{C}$	-	50	-		
Body Diode Ratings and Characteristic							
Forward diode voltage	V_{SD}	$V_{GS} = -5\text{ V}$, $I_{SD} = 9\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$	-	4.8	-	V	
Continuous diode forward current	I_{SD}	$V_{GS} = -5\text{ V}$, $T_J = 25\text{ }^{\circ}\text{C}$	-	-	33	A	
Pulsed diode forward current	I_{SDM}		-	-	82		
Reverse recovery time	t_{rr}	$V_{GS} = -5\text{ V}$, $I_{SD} = 18\text{ A}$, $V_R = 800\text{ V}$, $di/dt = 1000\text{ A}/\mu\text{s}$	-	18	-	ns	
Reverse recovery charge	Q_{rr}		-	60	-	nC	
Reverse recovery current	I_{RRM}		-	6	-	A	

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics

Fig. 4 - Typical Transfer Characteristics

Fig. 2 - Typical Output Characteristics

Fig. 5 - Normalized On-Resistance vs. Drain Current

Fig. 3 - Typical Output Characteristics

Fig. 6 - Typical Capacitance vs. Drain-to-Source Voltage


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

Fig. 10 - Typical Source-Drain Diode Forward Voltage

Fig. 8 - Normalized On-Resistance vs. Temperature

Fig. 11 - On-Resistance vs. Gate-to-Source Voltage

Fig. 9 - Drain-to-Source Voltage vs. Temperature

Fig. 12 - Threshold Voltage vs. Case Temperature


Fig. 13 - Drain Current vs. Case Temperature

Fig. 15 - Power, Dissipated P_D vs. Case Temperature

Fig. 14 - Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

Fig. 16 - Safe Operating Area

Fig. 17 - Transient Thermal Impedance


Fig. 18 - Waveforms of Switching Time

Fig. 21 - Waveforms for Gate Charge

Fig. 19 - Waveforms for Switching Energy

Fig. 22 - Waveforms for Reverse Recovery

Fig. 20 - Switching and Reverse Diode Characteristics Measurement Circuit

Fig. 23 - Thermal Equivalent Circuit

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