N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ)
30	0.028 at V_{GS} = 10 V	8[a]	6.2
	0.038 at V_{GS} = 4.5 V	7	

FEATURES

- TrenchFET® Power MOSFET
- 100 % R_g Tested

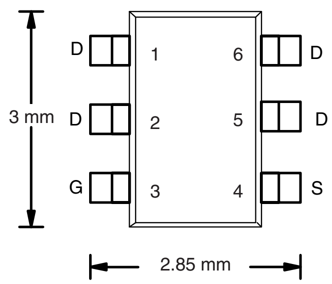
Pb-free

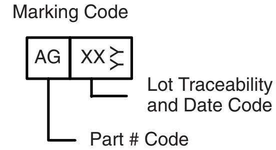
RoHS COMPLIANT

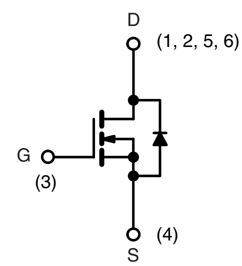
APPLICATIONS

- Load Switch for Portable Devices

TSOP-6
Top View







N-Channel MOSFET

Ordering Information: Si3424BDV-T1-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)[a]	T_C = 25 °C	I_D	8[a, b]	A
	T_C = 70 °C		6.7	
	T_A = 25 °C		7[c, d]	
	T_A = 70 °C		5.6[c, d]	
Pulsed Drain Current		I_{DM}	30	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	2.48	A
	T_A = 25 °C		1.74[c, d]	
Maximum Power Dissipation[a]	T_C = 25 °C	P_D	2.98	W
	T_C = 70 °C		1.9	
	T_A = 25 °C		2.1[c, d]	
	T_A = 70 °C		1.3[c, d]	
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[c]	t ≤ 5 s	R_{thJA}	50	60	°C/W
	Steady State	R_{thJA}	90	110	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	35	42	

Notes:
a. Package Limited.
b. Based on T_C = 25 °C.
c. Surface Mounted on 1" x 1" FR4 board.
d. t = 5 s.

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	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		23.75		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			5.8		
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} = 30 V, V_{GS} = 0 V			1	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 85 °C			10	µA
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = ≥ 5 V, V_{GS} = 10 V	30			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 7 A		0.023	0.028	Ω
		V_{GS} = 4.5 V, I_D = 5.8 A		0.0315	0.038	
Forward Transconductance	g_{fs}	V_{DS} = 15 V, I_D = 7 A		17		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		735		pF
Output Capacitance	C_{oss}			130		
Reverse Transfer Capacitance	C_{rss}			34		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 7 A		13.05	19.6	nC
		V_{DS} = 24V, V_{GS} = 4.5 V, I_D = 7 A		6.2	9.3	
Gate-Source Charge	Q_{gs}			2.16		
Gate-Drain Charge	Q_{gd}			2.15		
Gate Resistance	R_g	f = 1 MHz		2.45	3.7	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 2.7 Ω I_D ≅ 5.6 A, V_{GEN} = 10 V, R_g = 1 Ω		4.5	6.8	ns
Rise Time	t_r			10	15	
Turn-Off DelayTime	$t_{d(off)}$			16	24	
Fall Time	t_f			7	10.5	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 3.2 Ω I_D ≅ 4.7 A, V_{GEN} = 4.5 V, R_g = 1 Ω		18	27	
Rise Time	t_r			85	128	
Turn-Off DelayTime	$t_{d(off)}$			17	26	
Fall Time	t_f			12	18	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	T_C = 25 °C			2.48	A
Pulse Diode Forward Current[a]	I_{SM}				30	
Body Diode Voltage	V_{SD}	I_S = 3 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 3.2 A, di/dt = 100 A/µs		13.8	20.7	nC
Body Diode Reverse Recovery Charge	Q_{rr}			6.21	9.32	ns
Reverse Recovery Fall Time	t_a			8.5		
Reverse Recovery Rise Time	t_b			5.3		

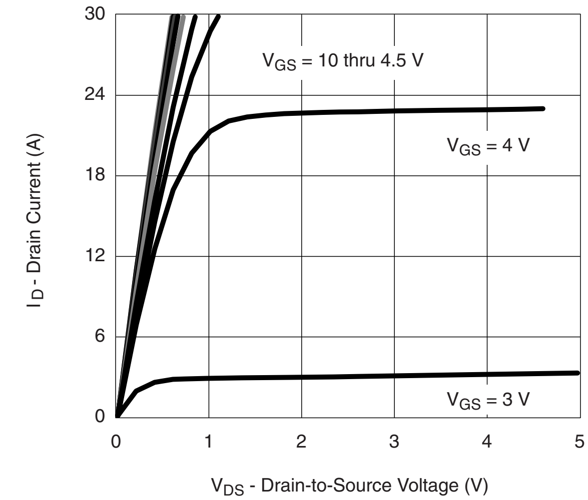
Notes:

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

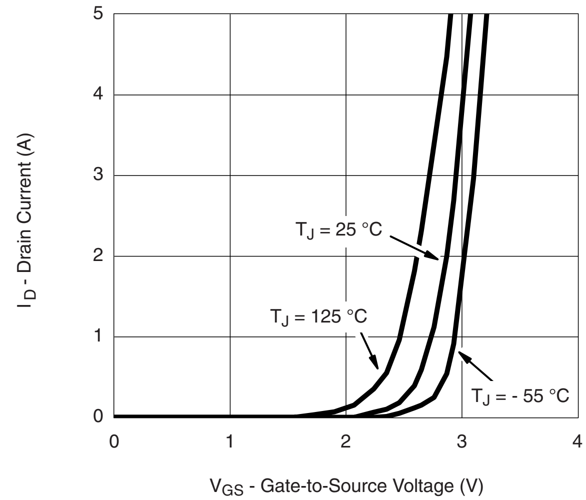
b. Guaranteed by design, not subject to production testing.

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.

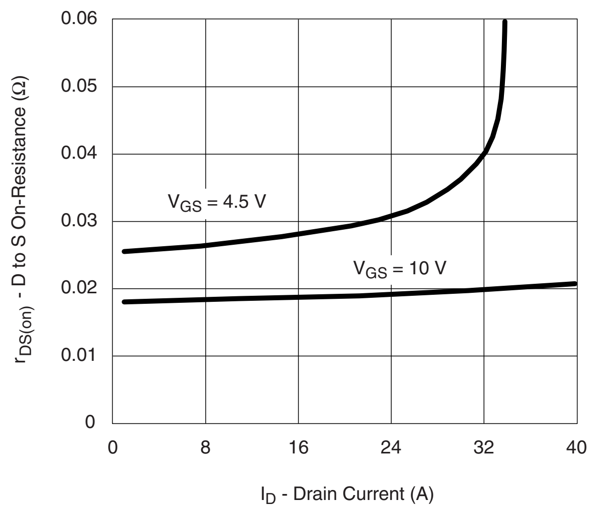
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



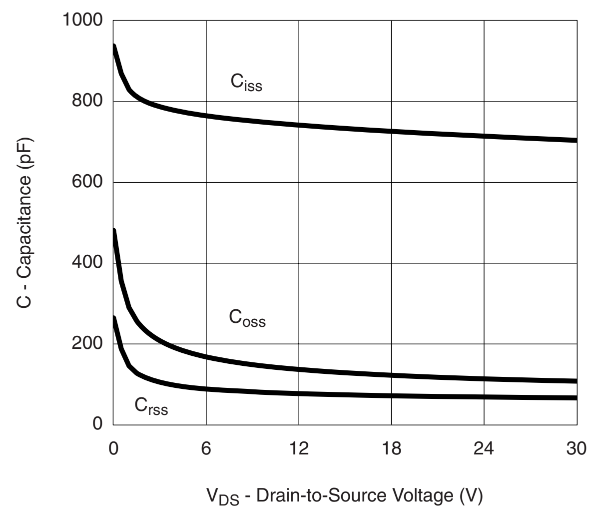
Output Characteristics



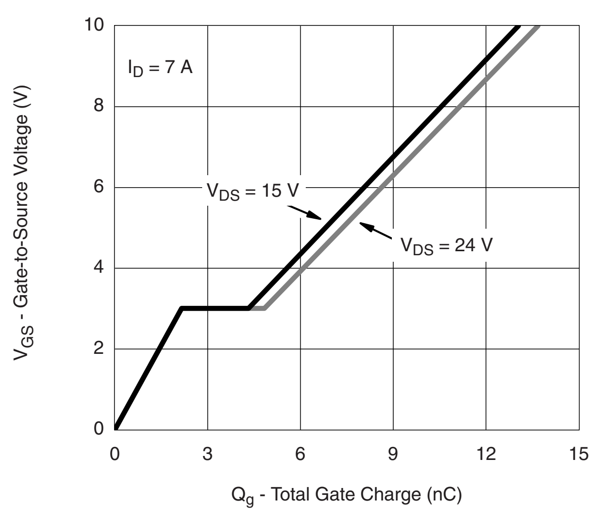
Transfer Characteristics curves vs. Temp



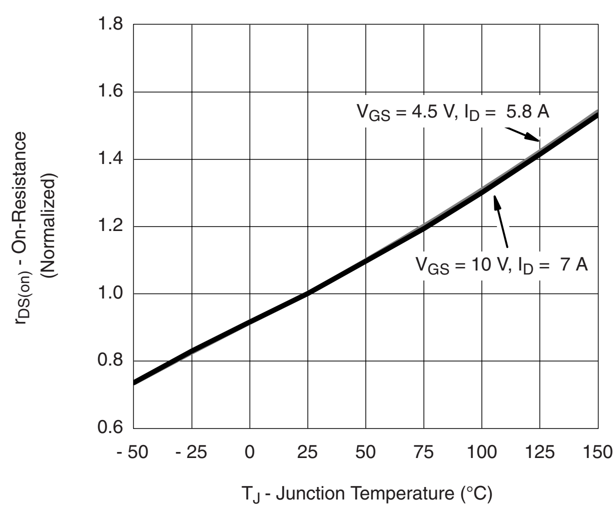
On-Resistance vs. Drain Current



Capacitance

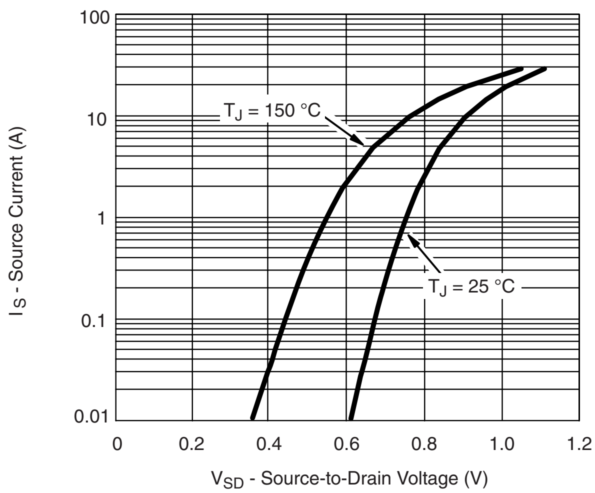


Q_g - Gate Charge

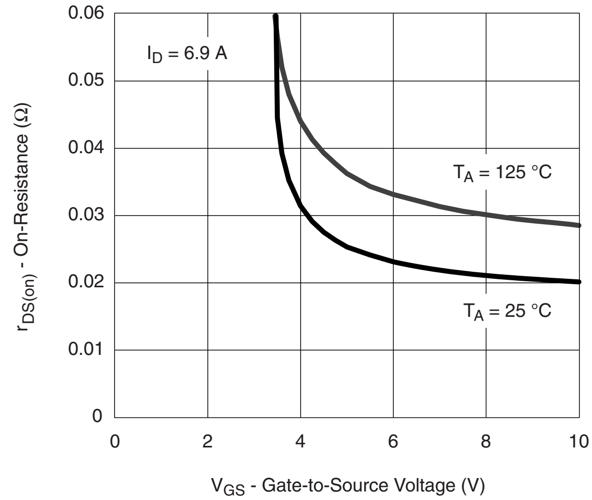


On-Resistance vs. Junction Temperature

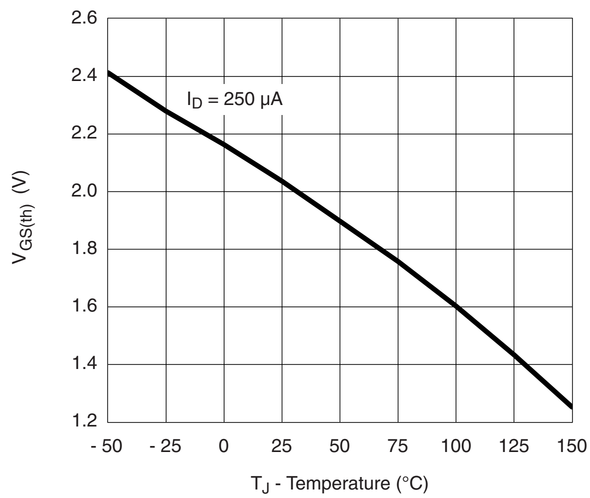
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



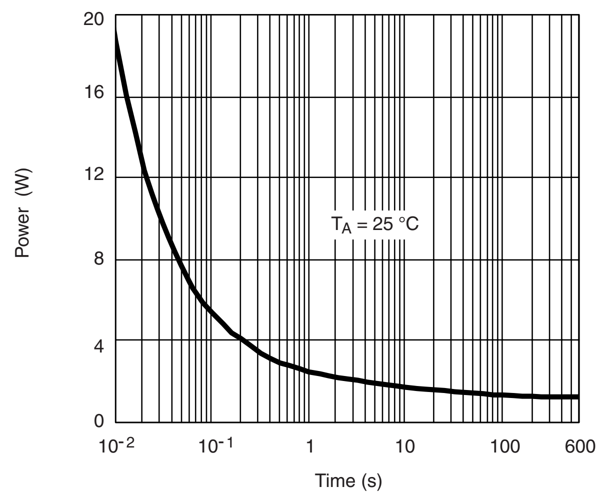
Source-Drain Diode Forward Voltage



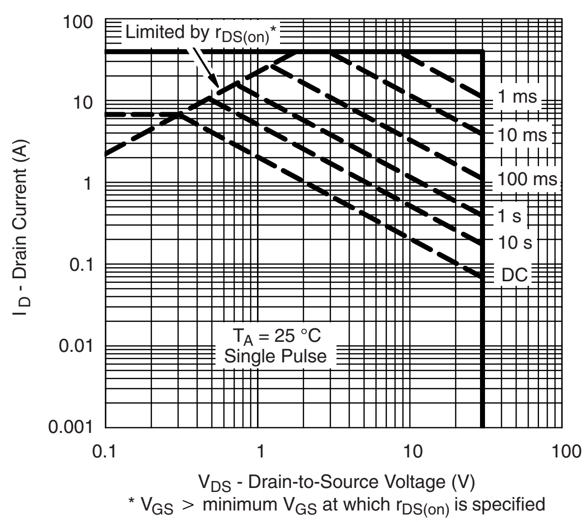
$r_{DS(on)}$ vs V_{GS} vs Temperature



Threshold Voltage



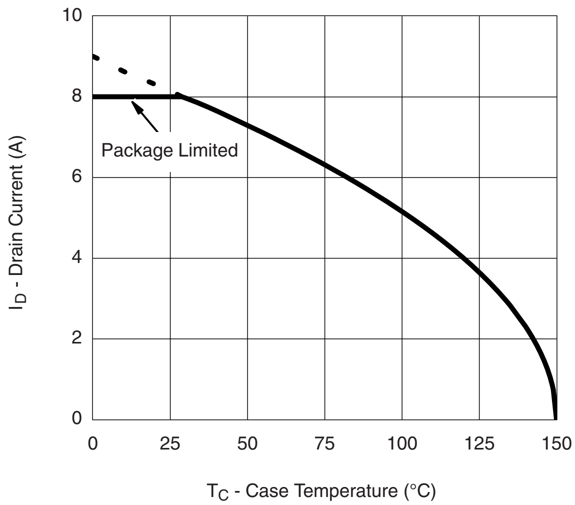
Single Pulse Power



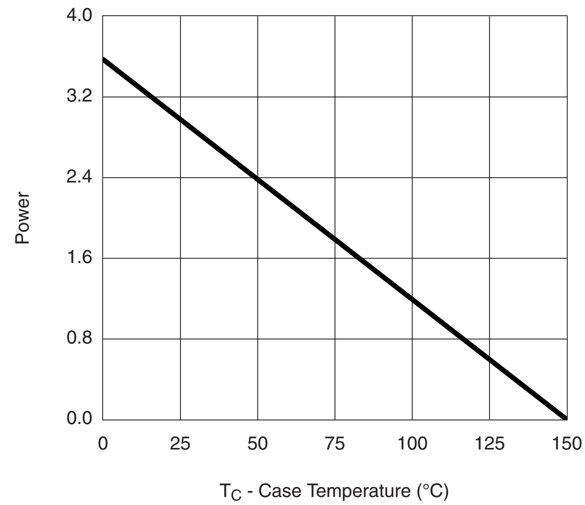
* V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



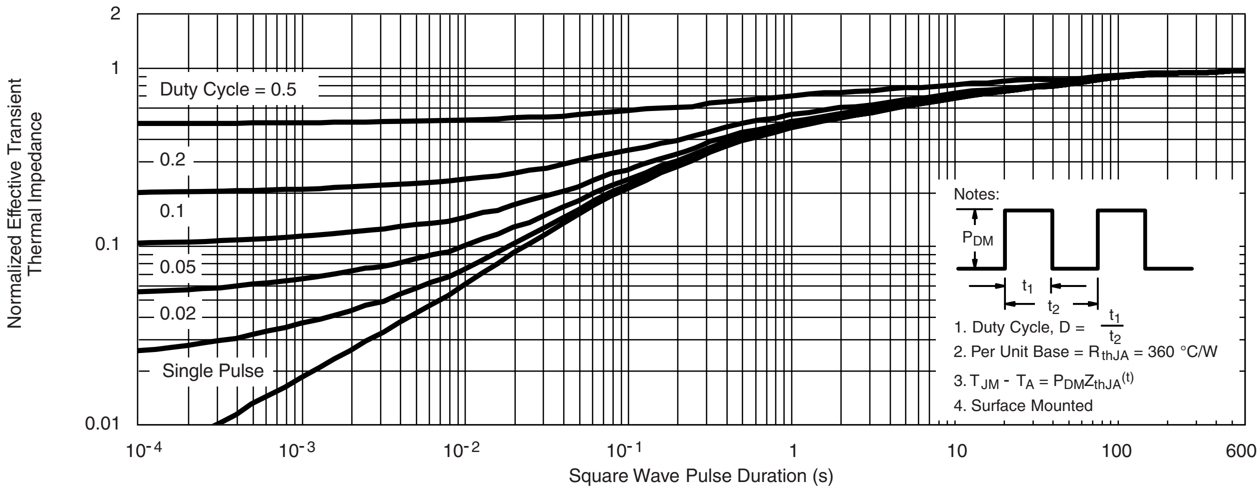
Current Derating*



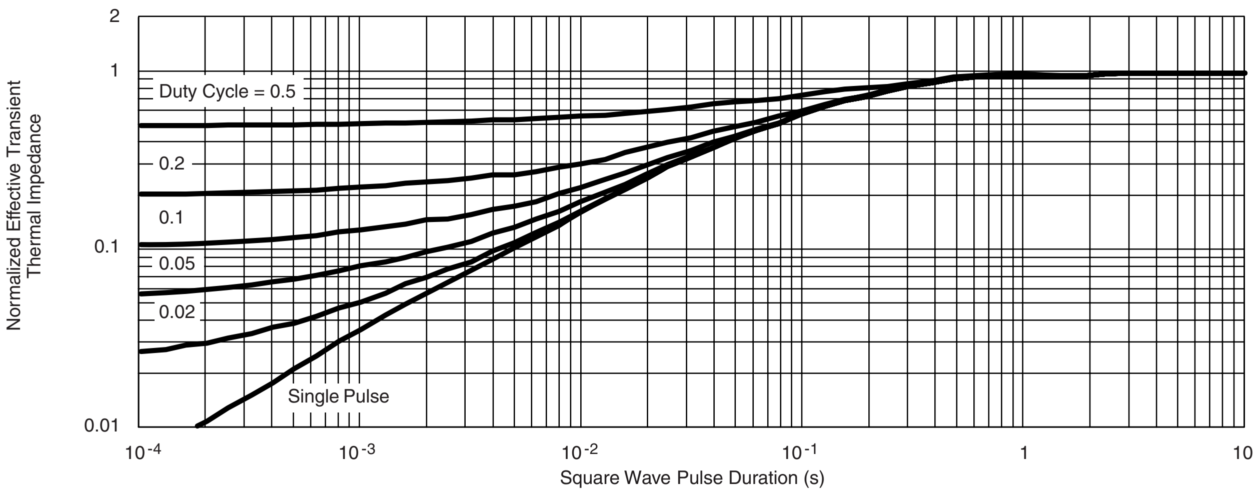
Power Derating

* 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 T_A = 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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