



New Product

Si4569DY
Vishay Siliconix

N- and P-Channel 40-V (D-S) MOSFET



RoHS
COMPLIANT

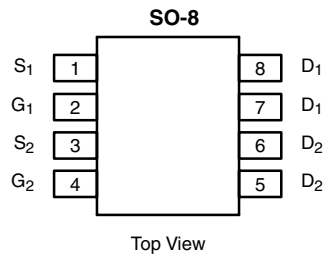
PRODUCT SUMMARY				
	V _{DS} (V)	r _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ)
N-Channel	40	0.027 at V _{GS} = 10 V	6.0	9.6
		0.032 at V _{GS} = 4.5 V	4.8	
P-Channel	-40	0.029 at V _{GS} = -10 V	-6.0	21
		0.039 at V _{GS} = -4.5 V	-4.9	

FEATURES

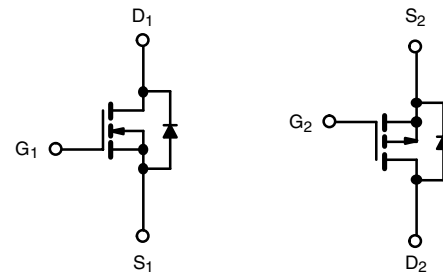
- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

- CCFL Inverter



Ordering Information: Si4569DY-T1—E3 (Lead (Pb)-free)



N-Channel MOSFET

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C UNLESS OTHERWISE NOTED)					
Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V _{DS}	40	-40	V
Gate-Source Voltage		V _{GS}	± 16		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	7.6	-7.9	A
	T _C = 70 °C		6.0	-6.3	
	T _A = 25 °C		6.0 ^{b, c}	-6.1 ^{b, c}	
	T _A = 70 °C		4.8 ^{b, c}	-4.9 ^{b, c}	
Pulsed Drain Current (10 μs Pulse Width)		I _{DM}	20	-20	A
Source-Drain Current Diode Current	T _C = 25 °C	I _S	2.6	-2.6	
	T _A = 25 °C		1.6 ^{b, c}	-1.6 ^{b, c}	
Pulsed Source-Drain Current		I _{SM}	20	-20	
Single Pulse Avalanche Current		I _{AS}	10	20	mJ
Single Pulse Avalanche Energy		E _{AS}	5	20	
Maximum Power Dissipation	T _C = 25 °C	P _D	3.1	3.2	W
	T _C = 70 °C		2	2.1	
	T _A = 25 °C		2 ^{b, c}	2 ^{b, c}	
	T _A = 70 °C		1.28 ^{b, c}	1.28 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to 150		°C

THERMAL RESISTANCE RATINGS							
Parameter		Symbol	N-Channel		P-Channel		Unit
			Typ	Max	Typ	Max	
Maximum Junction-to-Ambient ^{b, d}	t ≤ 10 sec	R _{thJA}	49	62.5	47	62.5	°C/W
Maximum Junction-to-Foot (Drain)	Steady-State	R _{thJF}	30	40	29	38	

Notes

- Based on T_C = 25 °C.
- Surface Mounted on 1" x 1" FR4 Board.
- t = 10 sec.
- Maximum under steady state conditions is 120 °C/W (n-channel) and 110 °C/W (p-channel).

SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Condition		Min	Typ ^a	Max	Unit
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	N-Ch	40			V
		V _{GS} = 0 V, I _D = -250 μA	P-Ch	-40			
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	N-Ch		37		
		I _D = -250 μA	P-Ch		-38		
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	N-Ch		-5		
		I _D = -250 μA	P-Ch		4.0		
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	N-Ch	0.6		2.0	
		V _{DS} = V _{GS} , I _D = -250 μA	P-Ch	-0.8		-2.2	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 16 V	N-Ch			100	nA
			P-Ch			-100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V	N-Ch			1	μA
		V _{DS} = -40 V, V _{GS} = 0 V	P-Ch			-1	
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 55 °C	N-Ch			10	
		V _{DS} = -40 V, V _{GS} = 0 V, T _J = 55 °C	P-Ch			-10	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	N-Ch	20			A
		V _{DS} = -5 V, V _{GS} = -10 V	P-Ch	-20			
Drain-Source On-State Resistance ^b	r _{DS(on)}	V _{GS} = 10 V, I _D = 6 A	N-Ch		0.022	0.027	Ω
		V _{GS} = -10 V, I _D = -6 A	P-Ch		0.024	0.029	
		V _{GS} = 4.5 V, I _D = 4.8 A	N-Ch		0.026	0.032	
		V _{GS} = -4.5 V, I _D = -4.9 A	P-Ch		0.031	0.039	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 6 A	N-Ch		20		S
		V _{DS} = -15 V, I _D = -6 A	P-Ch		17		
Dynamic^a							
Input Capacitance	C _{iss}	N-Channel V _{DS} = 20 V, V _{GS} = 0 V, f = 1 MHz P-Channel V _{DS} = -20 V, V _{GS} = 0 V, f = 1 MHz	N-Ch		855		pF
			P-Ch		1505		
Output Capacitance	C _{oss}		N-Ch		105		
			P-Ch		230		
Reverse Transfer Capacitance	C _{rss}		N-Ch		65		
			P-Ch		175		
Total Gate Charge	Q _g	V _{DS} = 20 V, V _{GS} = 10 V, I _D = 5 A	N-Ch		21	32	nC
		V _{DS} = -20 V, V _{GS} = -10 V, I _D = -5 A	P-Ch		41	62	
		N-Channel V _{DS} = 20 V, V _{GS} = 4.5 V, I _D = 5 A	N-Ch		9.6	14.5	
			P-Ch		21	31	
Gate-Source Charge	Q _{gs}	P-Channel V _{DS} = -20 V, V _{GS} = -4.5 V, I _D = -5 A	N-Ch		2.3		
			P-Ch		4.5		
Gate-Drain Charge	Q _{gd}	N-Ch		3.2			
		P-Ch		9.2			
Gate Resistance	R _g	f = 1 MHz	N-Ch		2.5	3.8	Ω
			P-Ch		6.5	10	



SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Condition	Min	Typ ^a	Max	Unit	
Dynamic^a							
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	6	12	ns	
			P-Ch	7	14		
Rise Time	t _r	P-Channel V _{DD} = -20 V, R _L = 4 Ω I _D ≅ -5 A, V _{GEN} = -10 V, R _g = 1 Ω	N-Ch	11	20		
			P-Ch	15	25		
Turn-Off Delay Time	t _{d(off)}	N-Channel V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	24	36		
			P-Ch	51	77		
Fall Time	t _f	P-Channel V _{DD} = -20 V, R _L = 4 Ω I _D ≅ -5 A, V _{GEN} = -10 V, R _g = 1 Ω	N-Ch	6	12		
			P-Ch	54	81		
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 5 A, V _{GEN} = 4.5 V, R _g = 1 Ω	N-Ch	12	20	ns	
			P-Ch	26	40		
Rise Time	t _r	P-Channel V _{DD} = -20 V, R _L = 4 Ω I _D ≅ -5 A, V _{GEN} = -4.5 V, R _g = 1 Ω	N-Ch	60	90		
			P-Ch	105	160		
Turn-Off Delay Time	t _{d(off)}	N-Channel V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	22	33		
			P-Ch	60	90		
Fall Time	t _f	P-Channel V _{DD} = -20 V, R _L = 4 Ω I _D ≅ -5 A, V _{GEN} = -4.5 V, R _g = 1 Ω	N-Ch	5	10		
			P-Ch	60	90		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	N-Ch		2.6	A	
			P-Ch		-2.6		
Pulse Diode Forward Current ^a	I _{SM}		N-Ch		20	A	
			P-Ch		-20		
Body Diode Voltage	V _{SD}	I _S = 1.5 A	N-Ch	0.73	1.2	V	
		I _S = -1.6 A	P-Ch	-0.73	-1.2		
Body Diode Reverse Recovery Time	t _{rr}	N-Channel I _F = 5 A, di/dt = 100 A/μs, T _J = 25 °C	N-Ch	26	40	ns	
			P-Ch	30	45		
Body Diode Reverse Recovery Charge	Q _{rr}	P-Channel I _F = -5 A, di/dt = -100 A/μs, T _J = 25 °C	N-Ch	21	32	nC	
			P-Ch	24	36		
Reverse Recovery Fall Time	t _a	N-Channel I _F = 5 A, di/dt = 100 A/μs, T _J = 25 °C	N-Ch	13		ns	
			P-Ch	15			
Reverse Recovery Rise Time	t _b	P-Channel I _F = -5 A, di/dt = -100 A/μs, T _J = 25 °C	N-Ch	13			
			P-Ch	15			

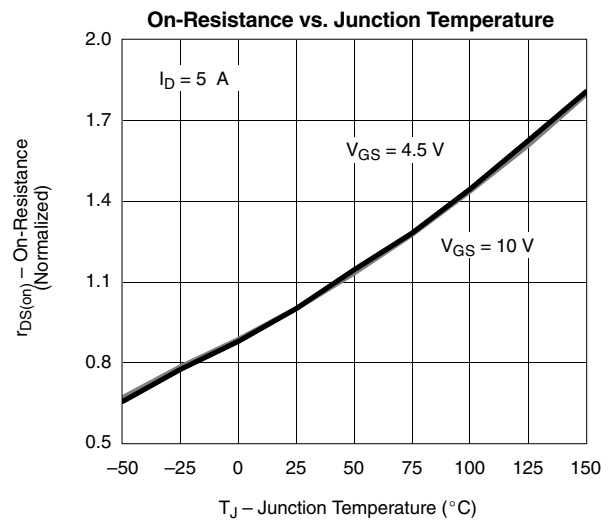
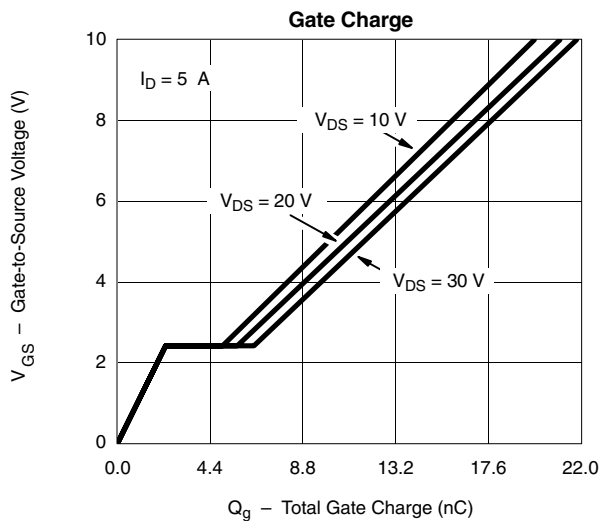
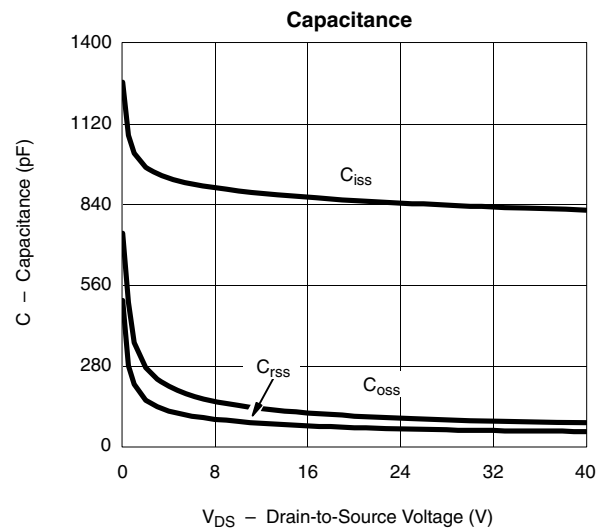
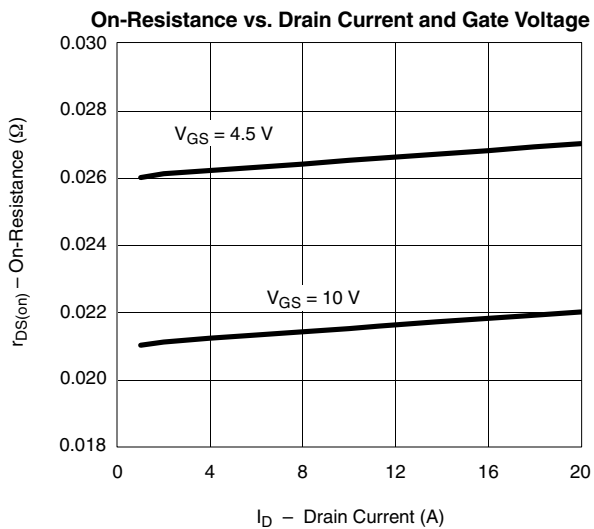
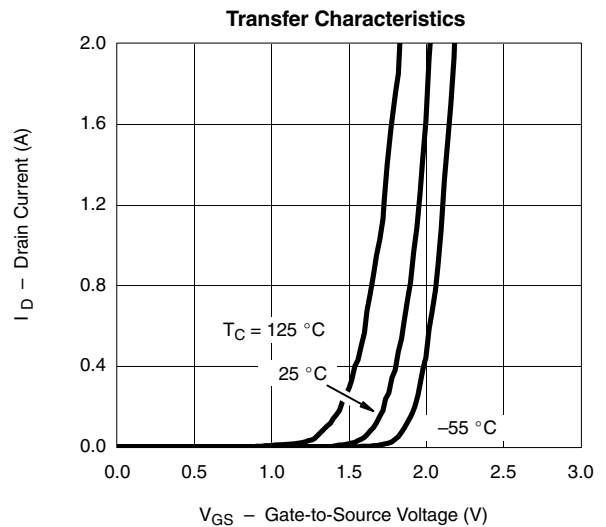
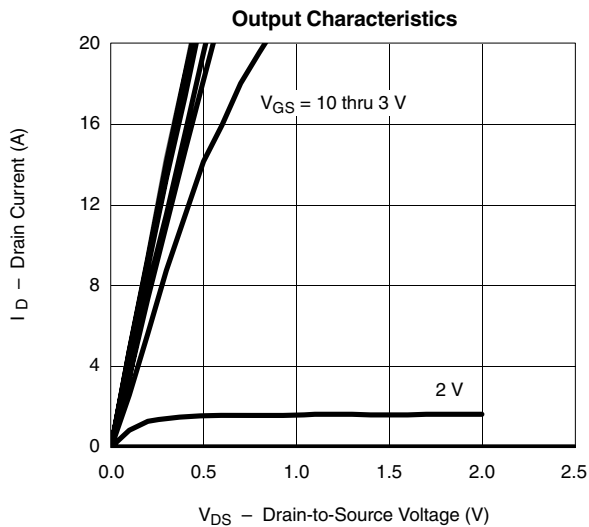
Notes

- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

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 NOTED)

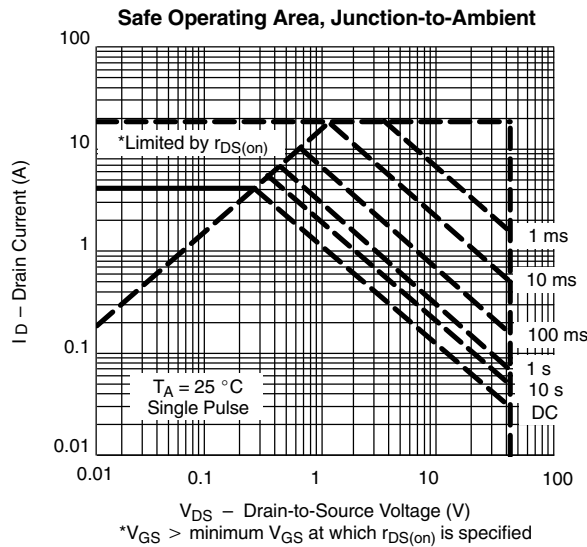
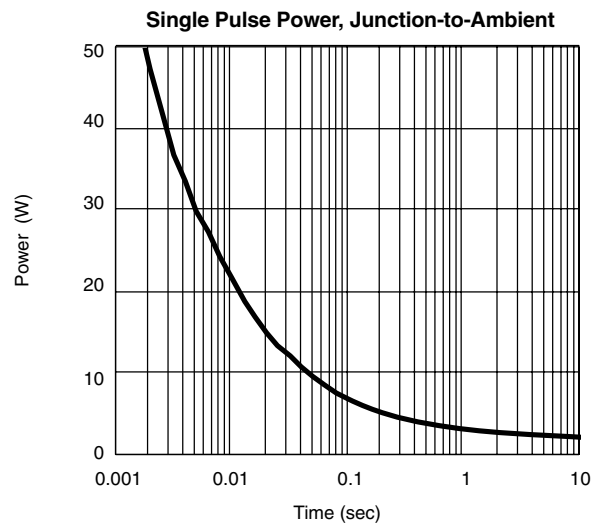
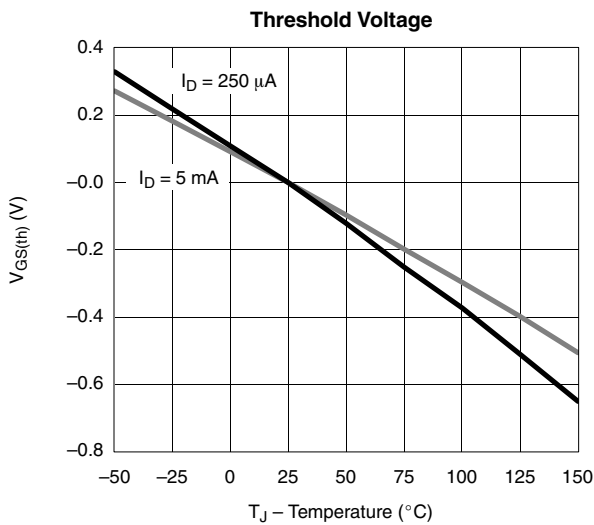
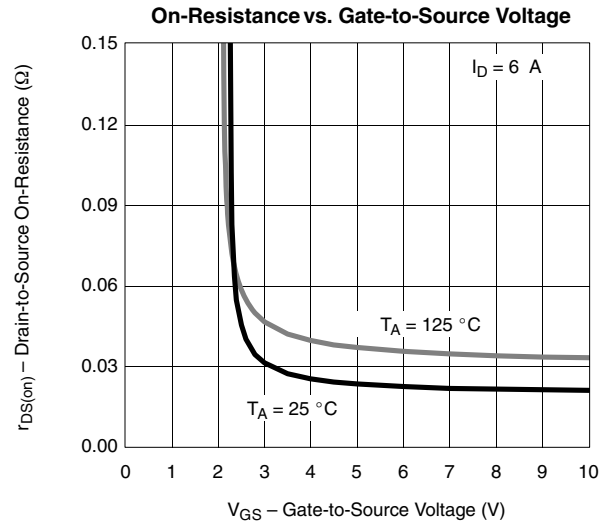
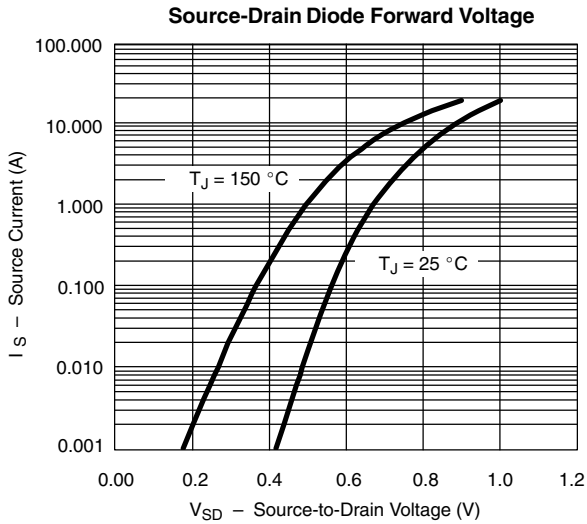
N-CHANNEL





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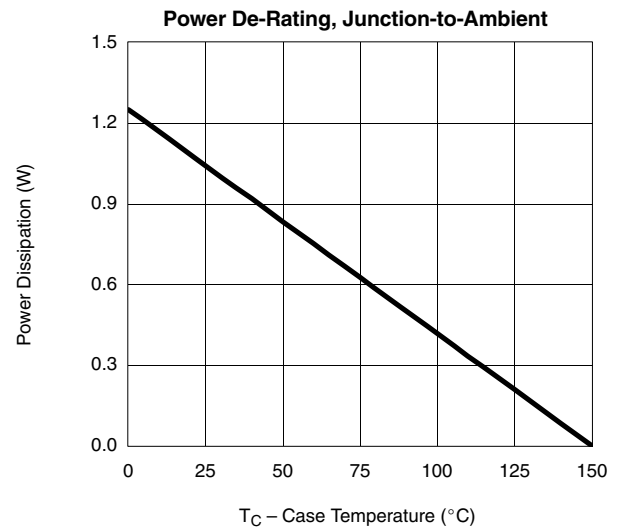
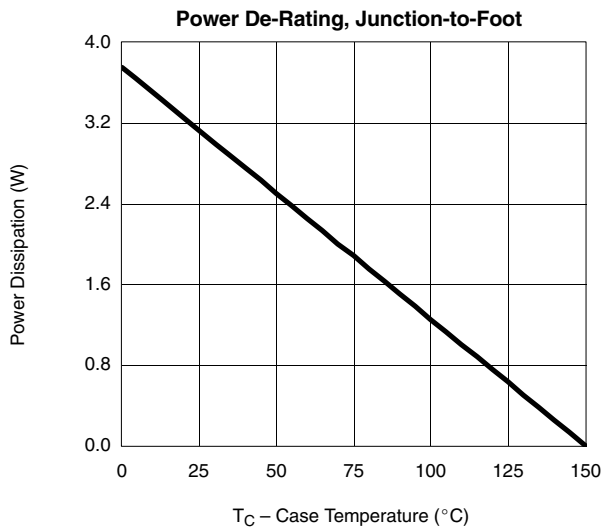
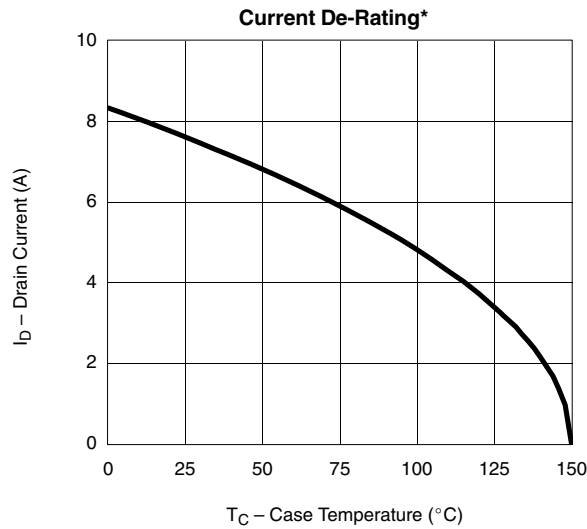
N-CHANNEL





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

N-CHANNEL

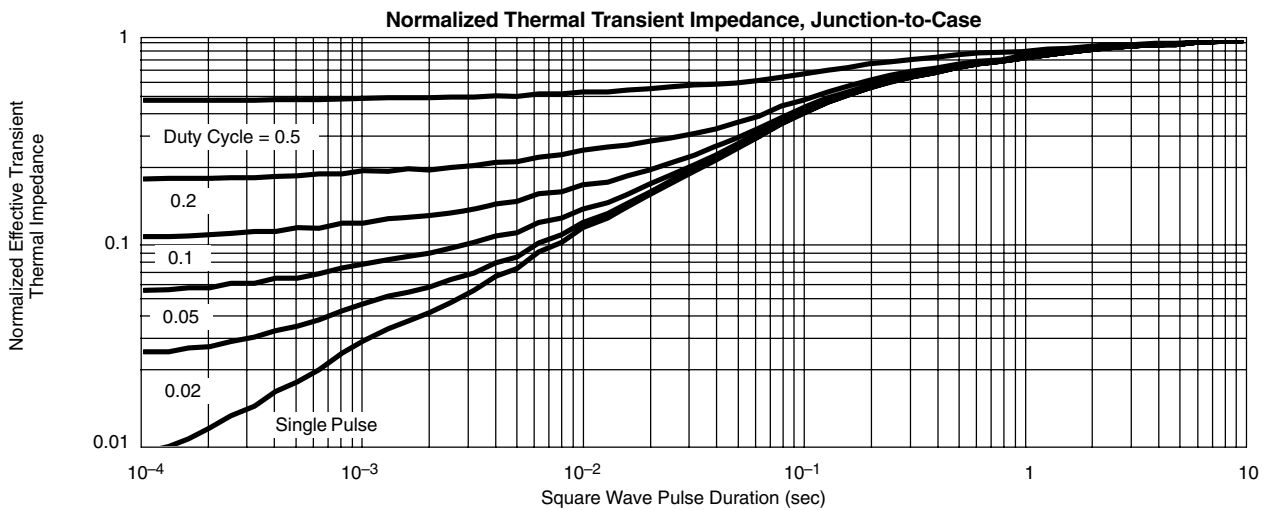
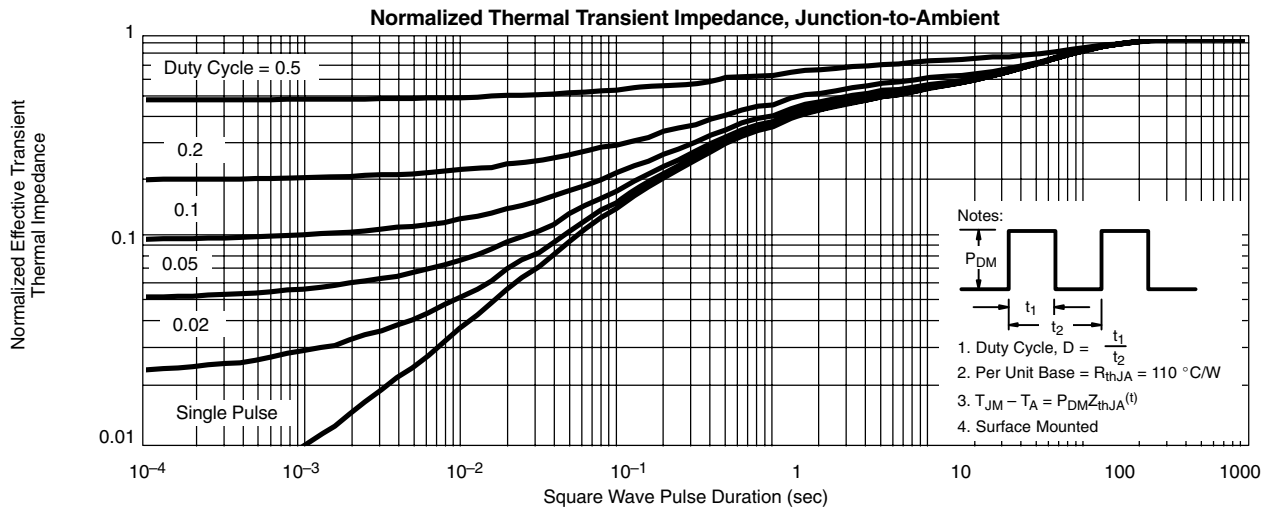


*The power dissipation P_b is based on $T_{J(max)} = 150\text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



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N-CHANNEL

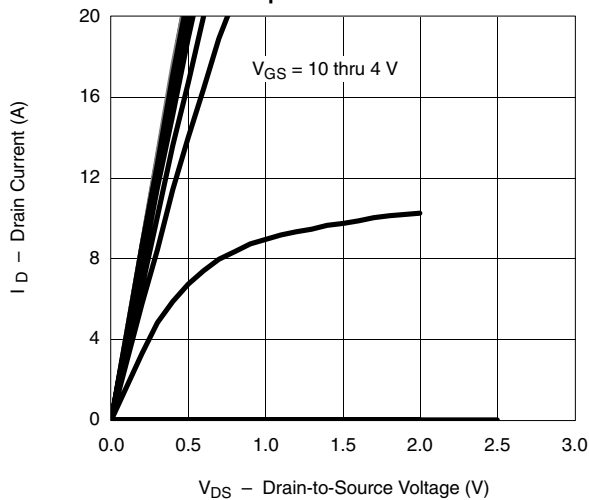




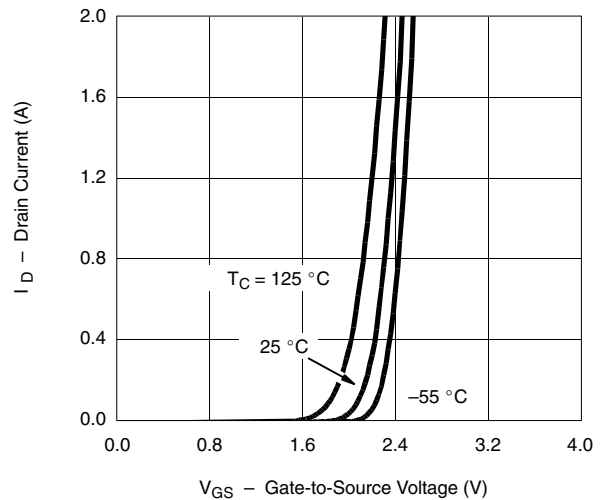
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL

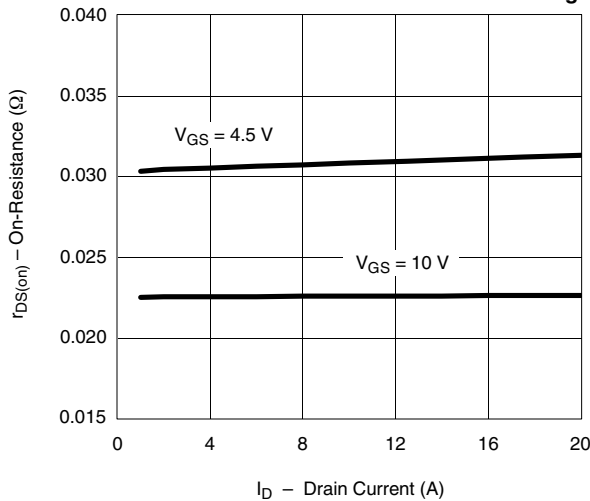
Output Characteristics



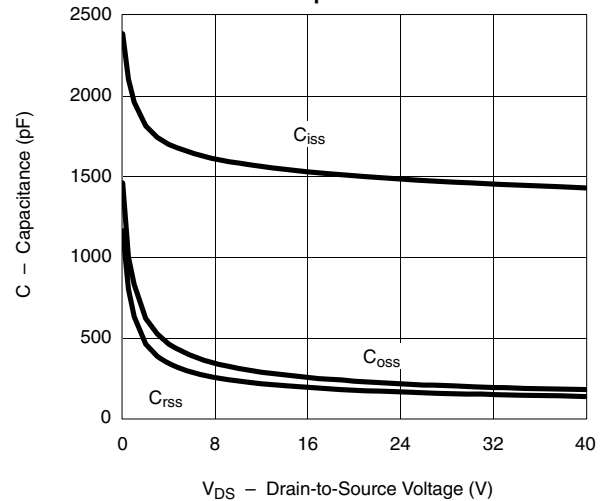
Transfer Characteristics



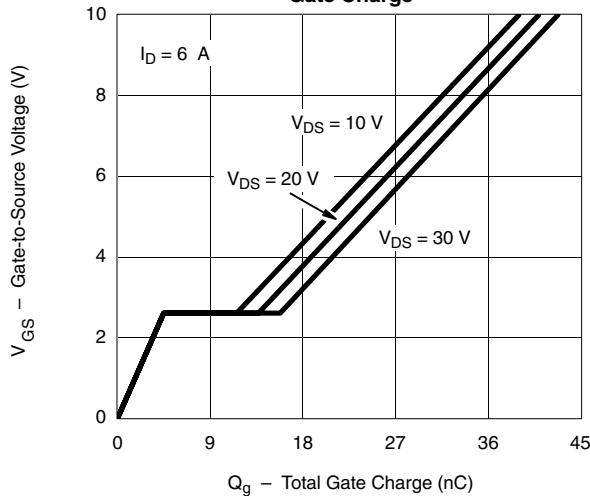
On-Resistance vs. Drain Current and Gate Voltage



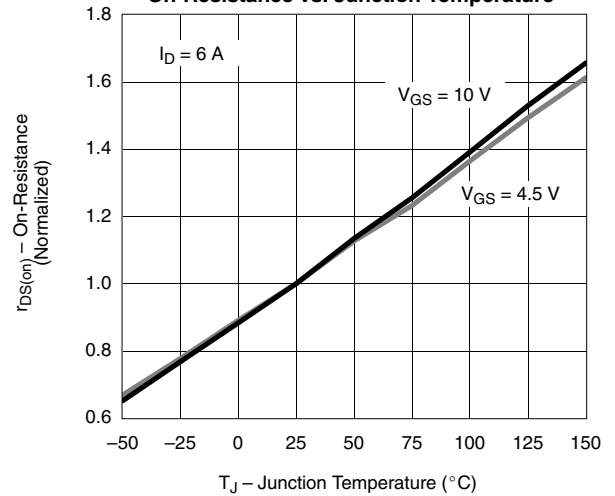
Capacitance



Gate Charge



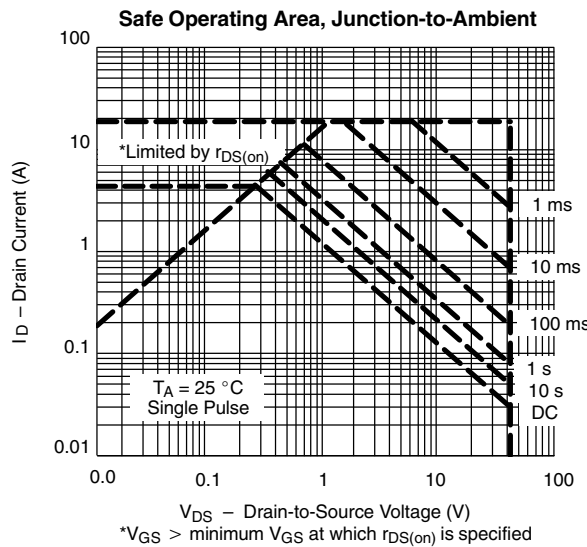
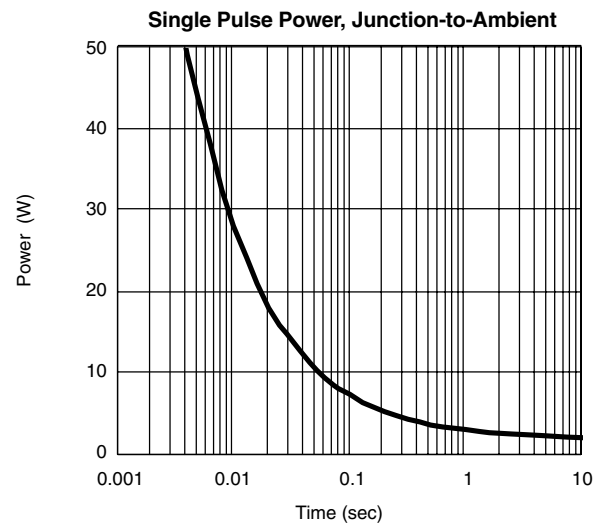
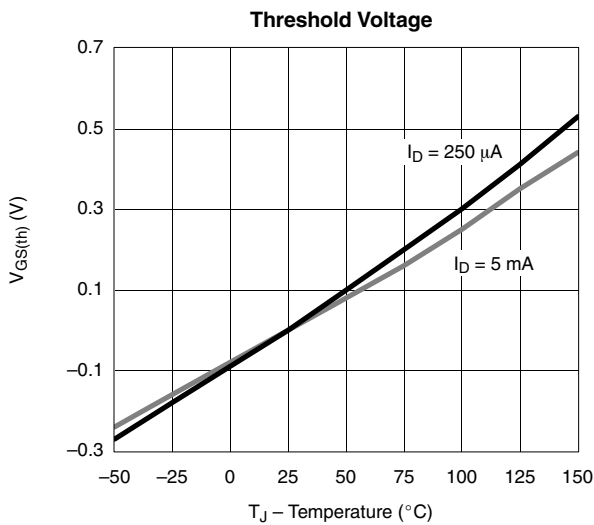
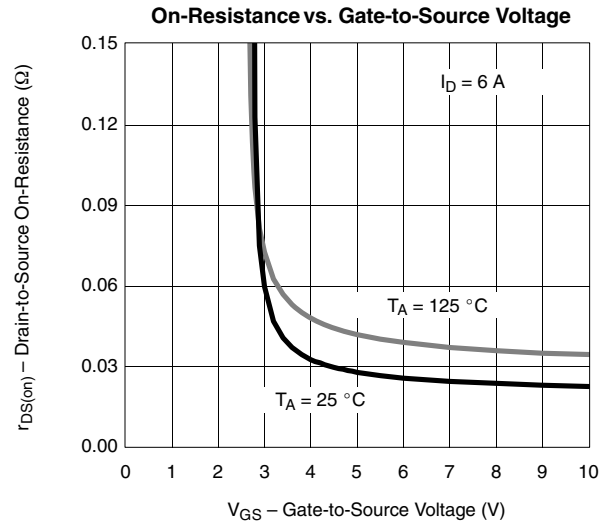
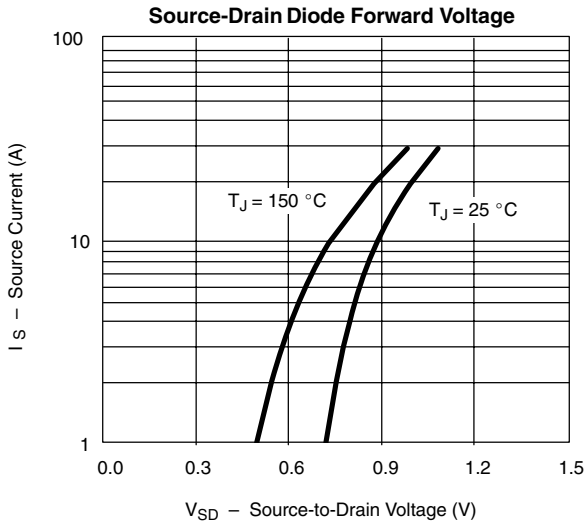
On-Resistance vs. Junction Temperature





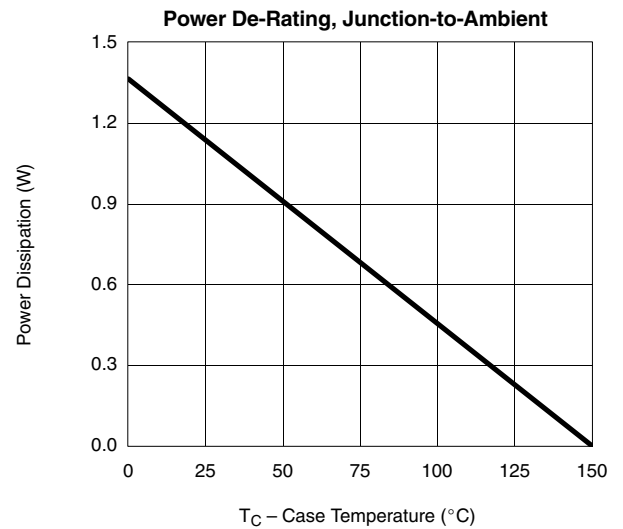
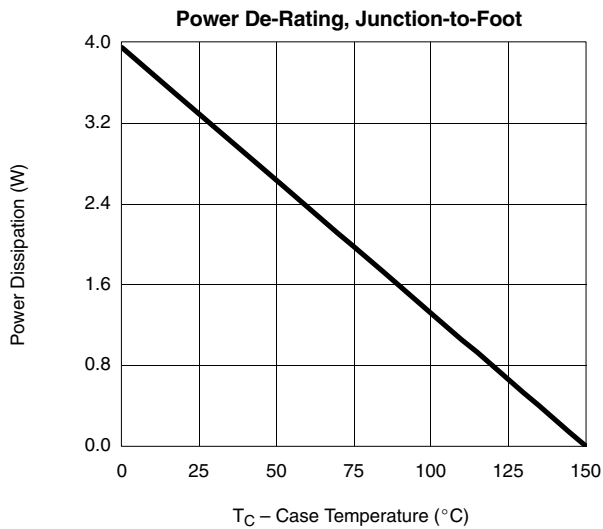
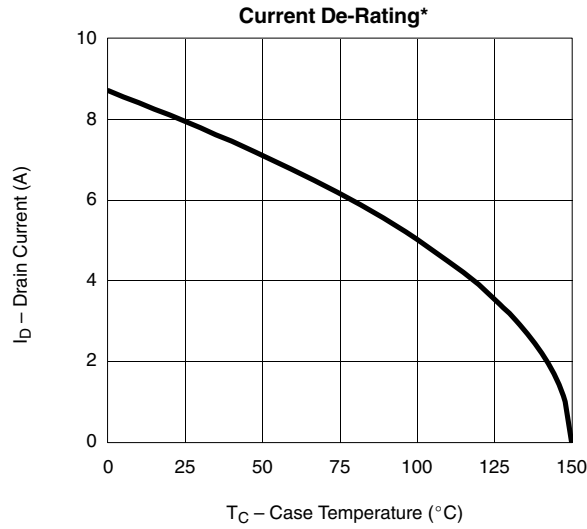
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL



TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL

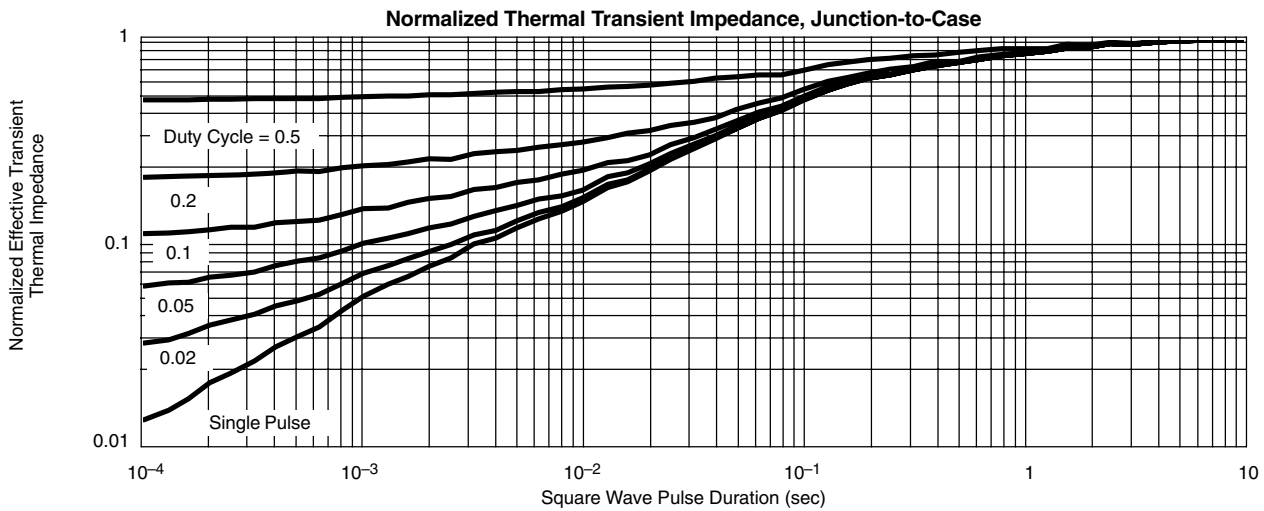
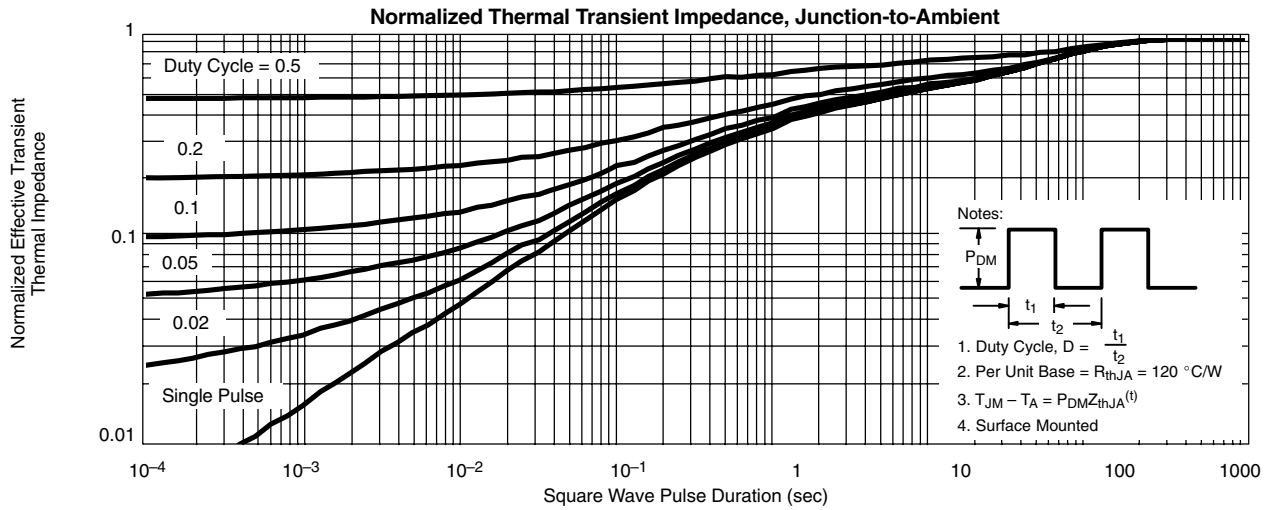


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TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL



Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?73586>.



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