

Product Highlight

Features

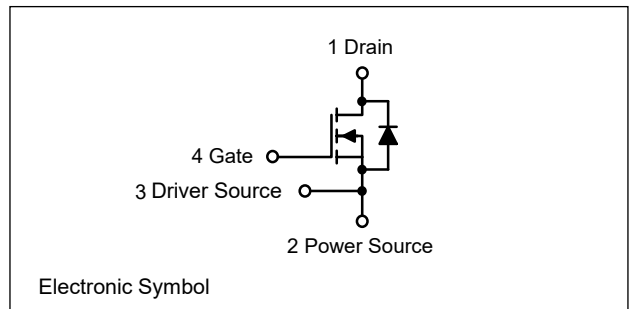
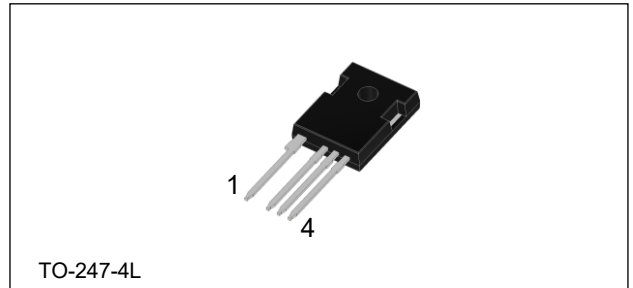
- High switching speed with a low gate charge
- Fast intrinsic diode with low reverse recovery
- Robust Avalanche Capability
- 100% Avalanche Tested
- Pb-free, Halogen Free, and RoHS Compliant

Benefits

- System efficiency improvement
- Higher frequency applicability
- Increased power density
- Reduced cooling effort

Applications

- Solar inverter
- EV charging station
- UPS
- Industrial power supply



Key Parameters

$BV_{DSS, T_C=25^\circ C}$	$I_D, T_C=25^\circ C$	$R_{DS(on), typ}$	$Q_{g, typ}$
650 V	75 A	27 mΩ	91 nC

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
MSQS065R027T2TH	065R027T2	TO-247-4L	Tube	30 units

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		650	V
V_{GS}	Gate to Source Voltage (DC)		-10 / +22	V
V_{GSop}	Recommended Operation Value		-5...-3 / +18	V
I_D	Drain Current	Continuous ($T_C = 25^\circ C$)	75*	A
		Continuous ($T_C = 100^\circ C$)	53*	
I_{DM}	Drain Current	Pulsed (Note1)	200*	A
P_D	Power Dissipation	($T_C = 25^\circ C$)	273	W
		Derate Above $25^\circ C$	1.82	W/ $^\circ C$
T_J	Operating Temperature Range		-55 to 175	$^\circ C$

*Limited by maximum junction temperature.

Note 1. Repetitive rating: pulse-width limited by maximum junction temperature.

1. Package

Temperature Ratings

Symbol	Parameter	Value	Unit
T _{STG}	Storage Temperature Range	-55 to 175	°C
T _L	Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds	260	°C

Thermal Characteristics

Symbol	Parameter	Value	Unit
R _{θJC}	Thermal Resistance, Junction to Case, Max.	0.55	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient, Max.	40	

2. MOSFET

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} = 0 V, I _D = 1 mA	650			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650 V, V _{GS} = 0 V		1	100	μA
		V _{DS} = 650 V, V _{GS} = 0 V, T _J = 175°C		10		
I _{GSS}	Gate-Source Leakage Current	V _{GS} = +22 V, V _{DS} = 0 V			+100	nA
		V _{GS} = -10 V, V _{DS} = 0 V			-100	
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 11.7 mA (tested after V _{GS} = 22V, 1 ms pulse)	1.8	2.8	4.5	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 18 V, I _D = 35 A		27	38	mΩ
		V _{GS} = 18 V, I _D = 35 A, T _J = 175°C		35		
g _{fs}	Transconductance	V _{DS} = 20 V, I _D = 35 A		25.9		S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 400 V, V _{GS} = 0V, f = 250 kHz		1853		pF
C _{oss}	Output Capacitance			207		
C _{rss}	Reverse Capacitance			10.5		
E _{oss}	Stored Energy in Output Capacitance	V _{DS} = 0 V to 400 V, V _{GS} = 0 V		20.6		μJ
C _{o(er)}	Energy Related Output Capacitance			257		pF
C _{o(tr)}	Time Related Output Capacitance			372		
Q _{g(tot)}	Total Gate Charge	V _{DS} = 400 V, I _D = 35 A, V _{GS} = -5 V / 18 V, Inductive load		91		nC
Q _{gs}	Gate to Source Charge			25		
Q _{gd}	Gate to Drain “Miller” Charge			21		
R _G	Internal Gate Resistance	f = 1MHz		3.0		Ω
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} = 400 V, I _D = 35 A, V _{GS} = -5 V / 18 V, R _G = 5.6 Ω, Inductive load		19		ns
t _r	Turn-On Rise Time			17		
t _{d(off)}	Turn-Off Delay Time			40		
t _f	Turn-Off Fall Time			8		
E _{on}	Turn-on Switching Energy			65		μJ
E _{off}	Turn-off Switching Energy			105		
E _{tot}	Total Switching Energy			170		

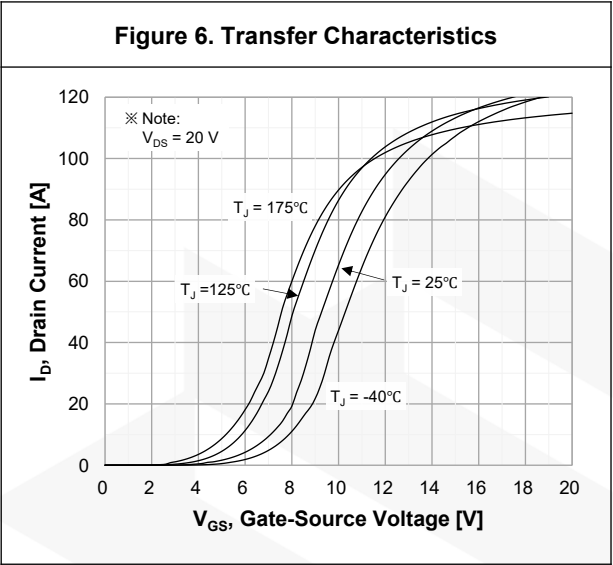
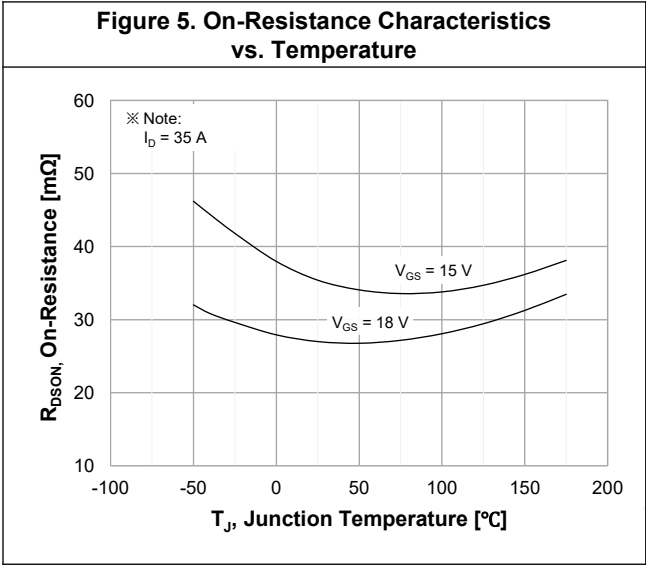
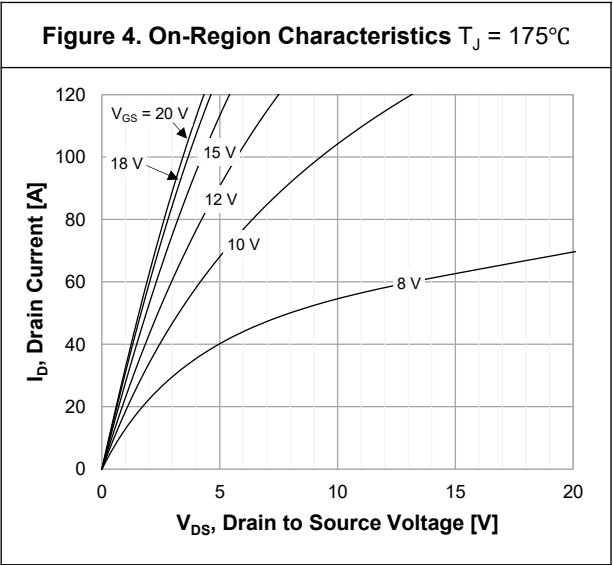
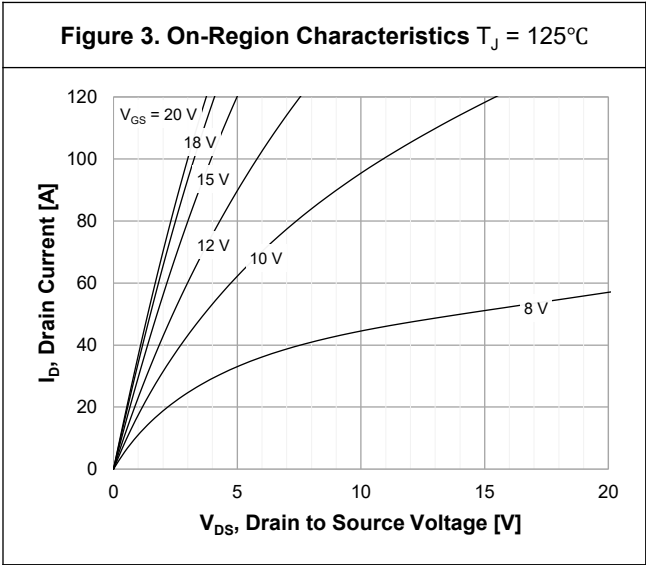
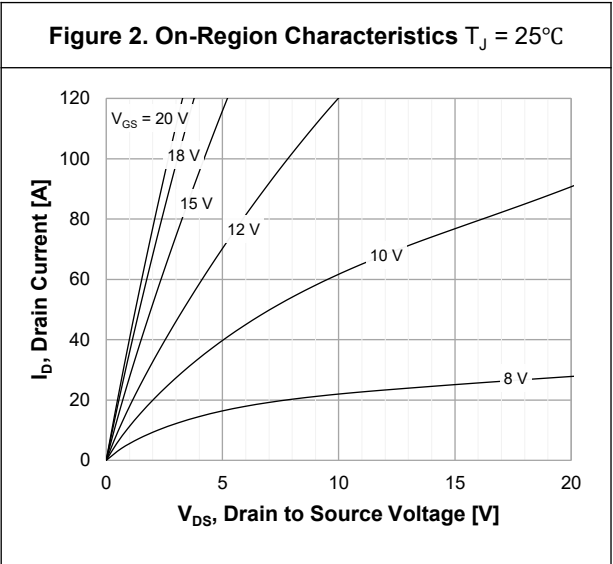
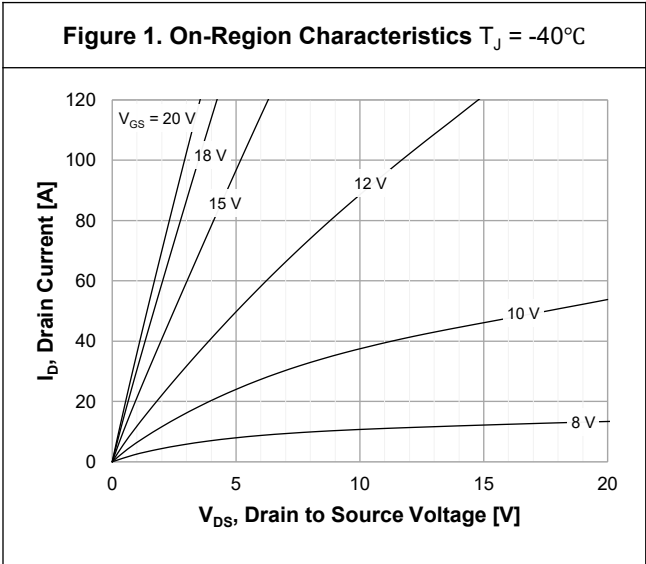
3. Body Diode

Electrical Characteristics (T_C = 25°C unless otherwise noted)

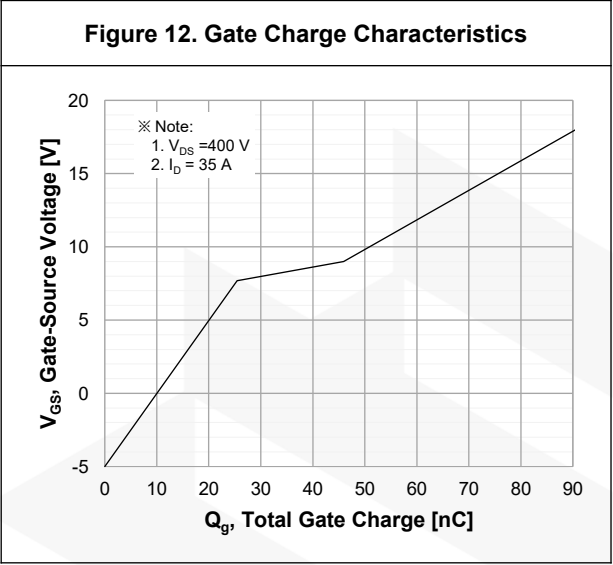
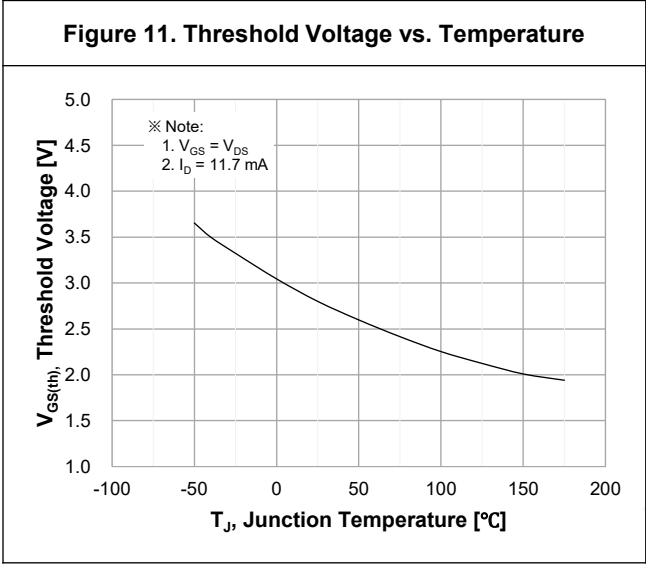
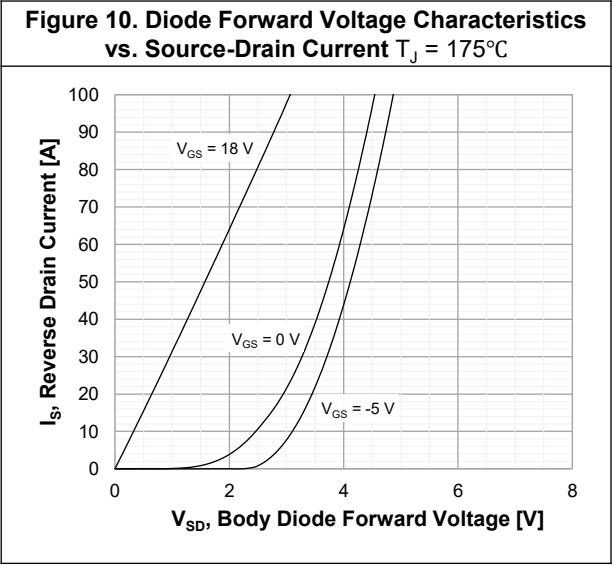
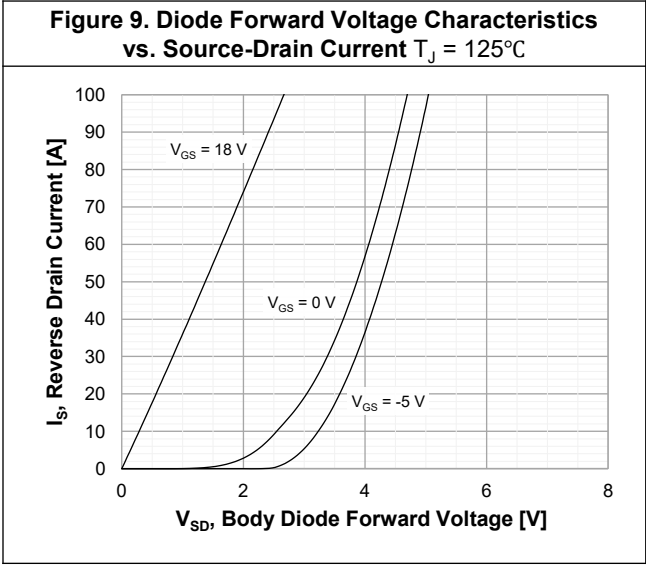
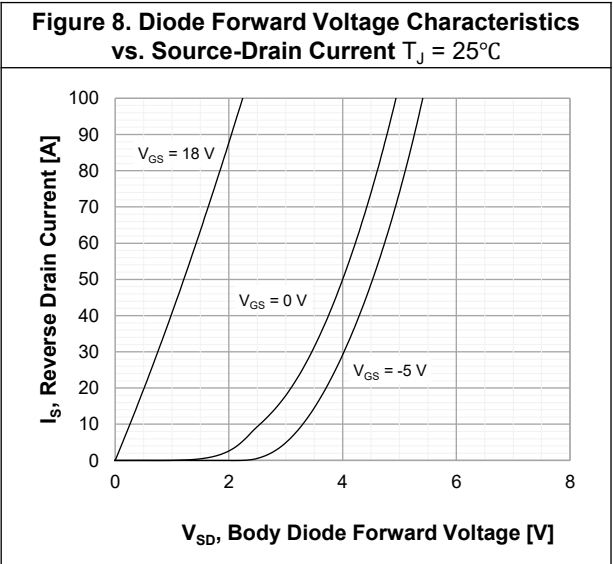
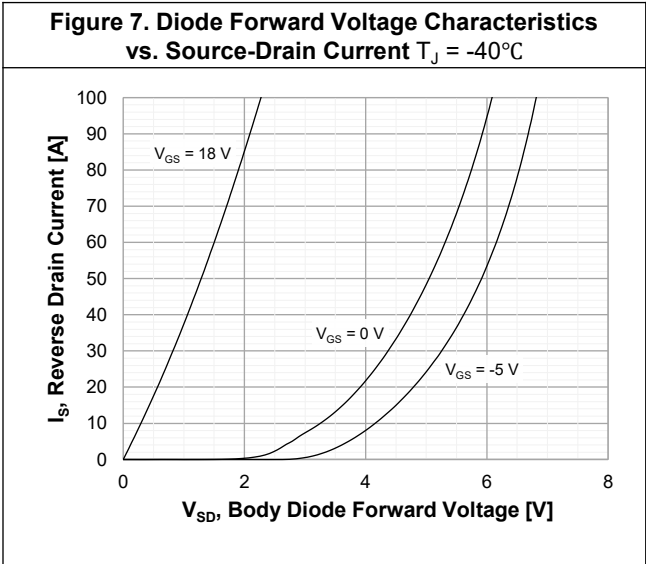
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Source-Drain Diode Characteristics						
I _S	Maximum Continuous Diode Forward Current				*75	A
I _{SM}	Maximum Pulsed Diode Forward Current				*200	
V _{SD}	Diode Forward Voltage	V _{GS} = -5 V, I _{SD} = 35 A		4.2		V
t _{rr}	Reverse Recovery Time	V _{DD} = 400 V, I _{SD} = 35 A, di _F /dt = 1000 A/μs, Includes Q _{OSS}		20		ns
Q _{rr}	Reverse Recovery Charge			141		nC
I _{rrm}	Peak Reverse Recovery Current			11.5		A

*Limited by maximum junction temperature.

4. Typical Performance Characteristics



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Figure 13. Stored Energy in Output Capacitance

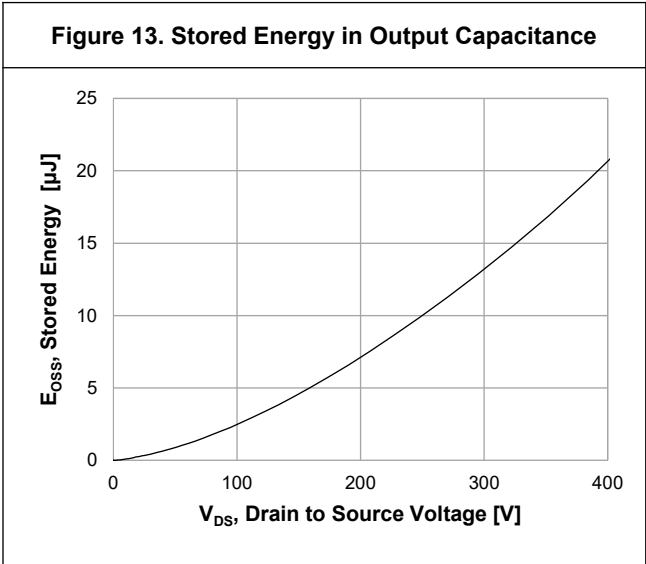


Figure 14. Capacitance Characteristics

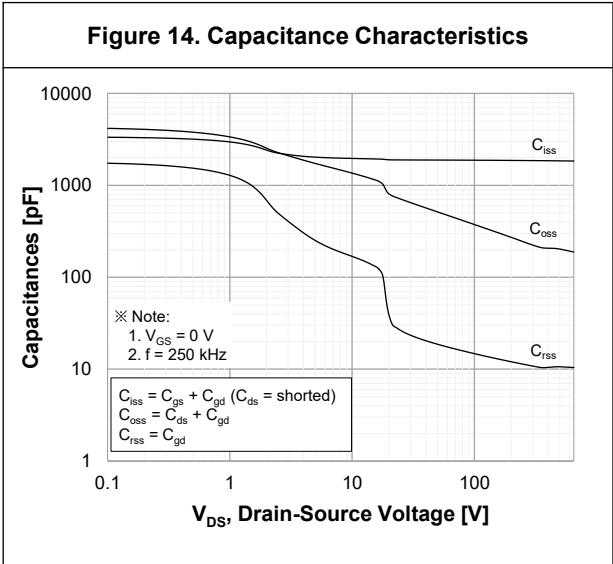


Figure 15. Continuous Drain Current Derating vs. Case Temperature

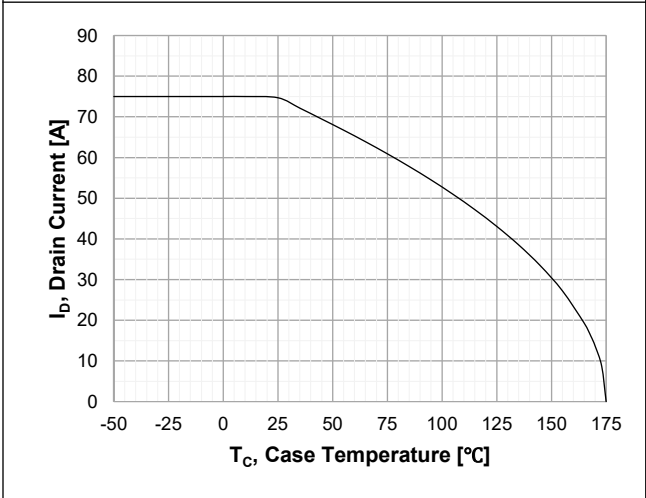


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

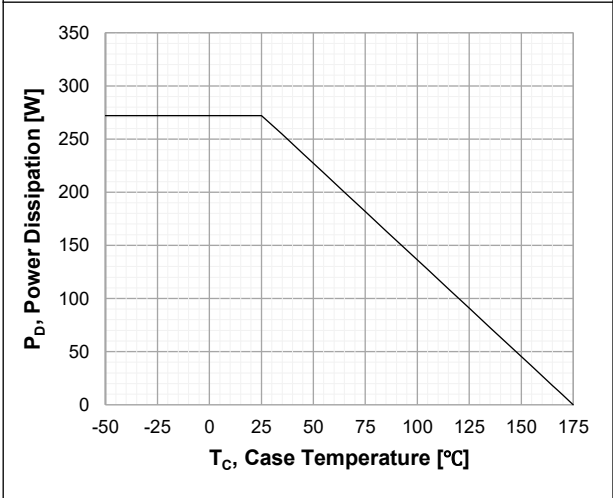


Figure 17. Typ. Switching Losses vs. Drain Current

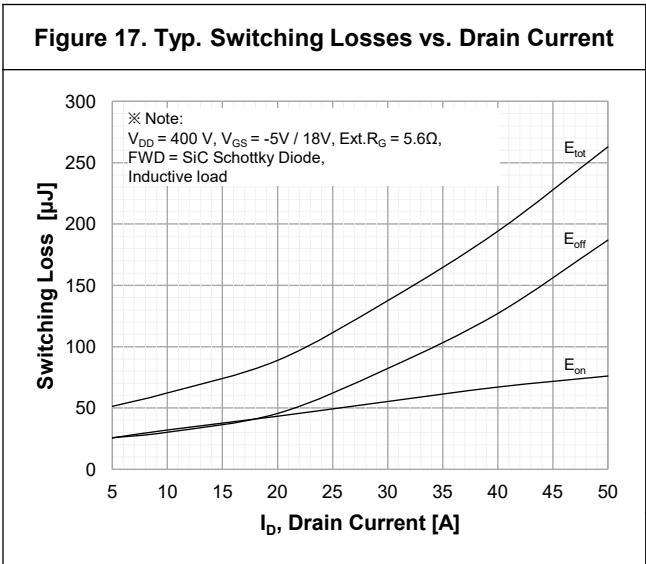
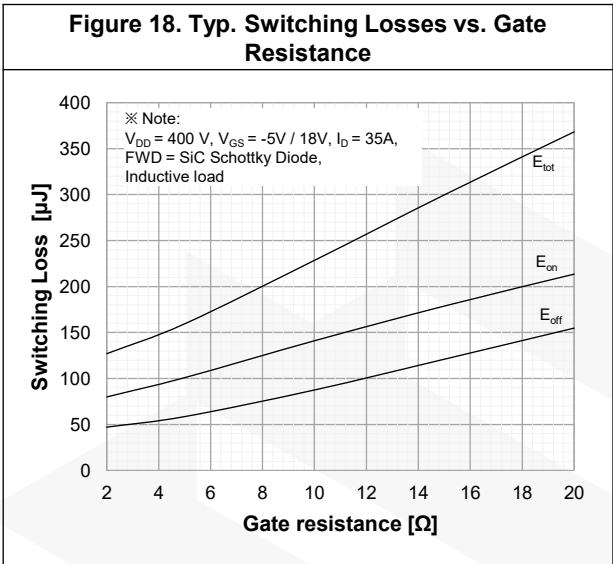
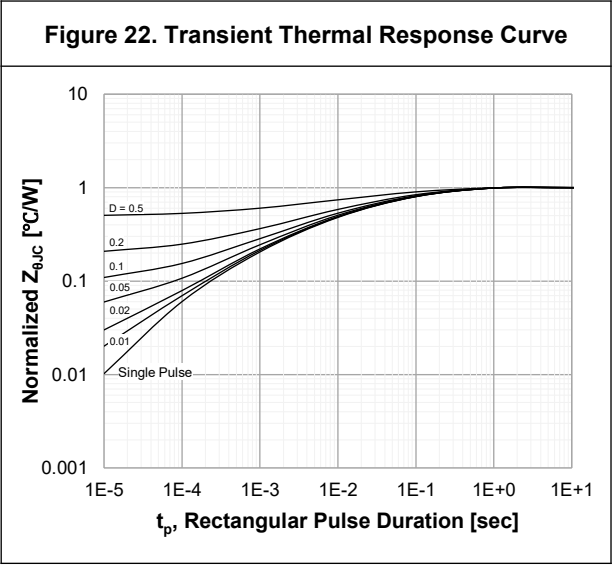
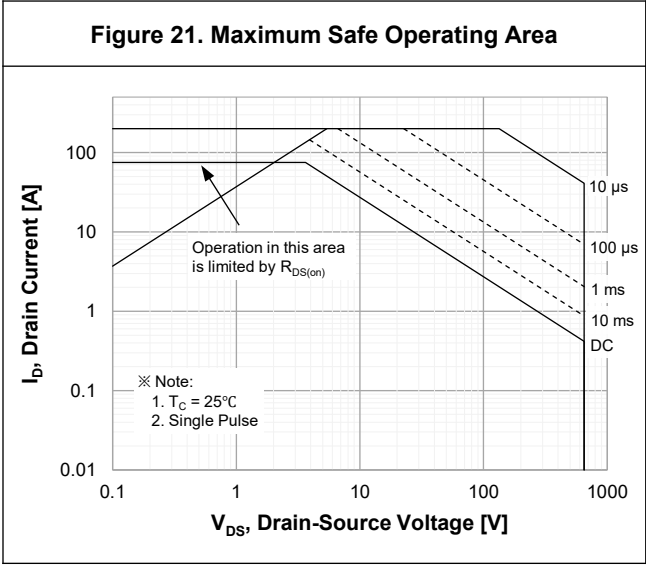
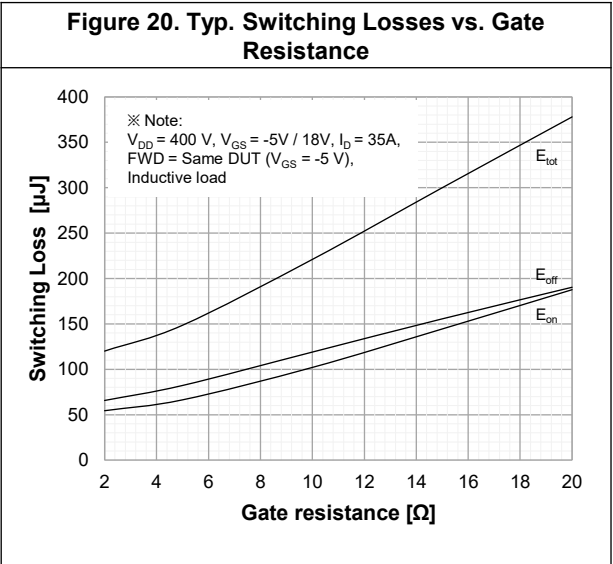
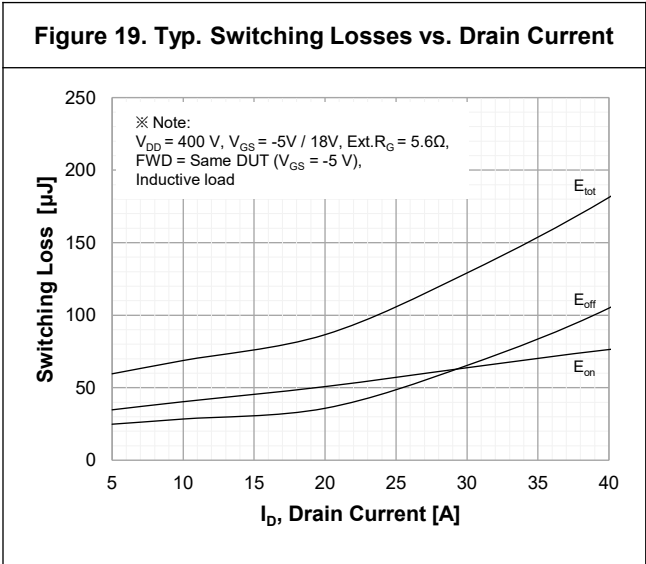


Figure 18. Typ. Switching Losses vs. Gate Resistance



4. Typical Performance Characteristics



5. Testing conditions

Figure 23. Inductive Load Switching Test Circuit and Waveforms

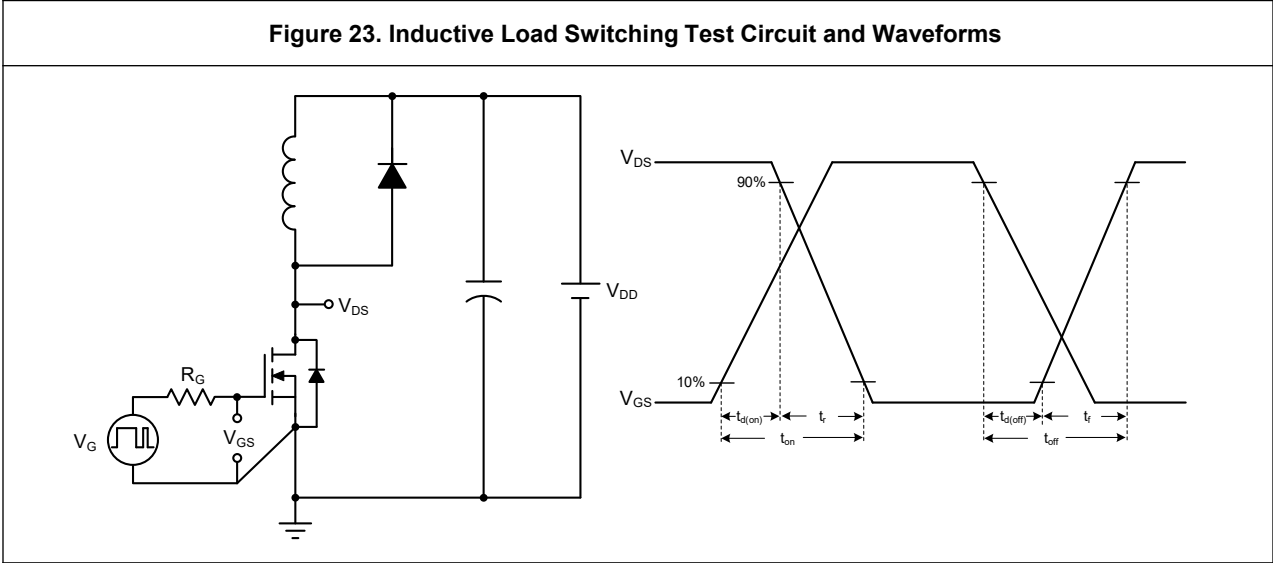
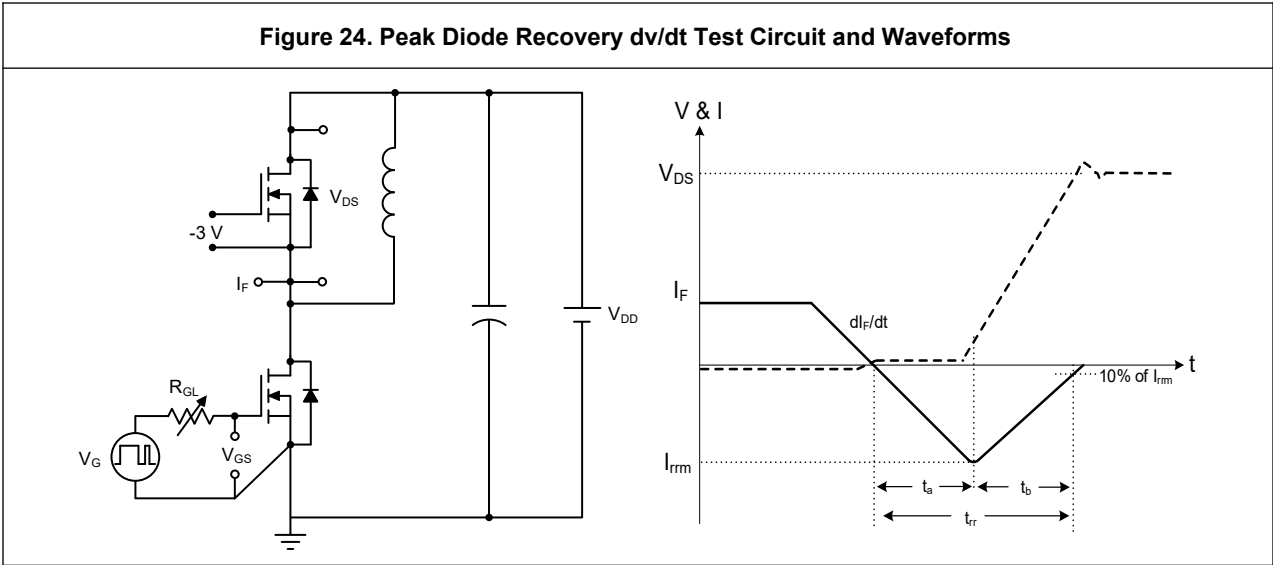


Figure 24. Peak Diode Recovery dv/dt Test Circuit and Waveforms



6. Package Outlines – TO-247-4L

* Dimensions in millimeters

